Studies in Euphorbiaceae A.L.Juss. *sens. lat.* 3. A revision of *Bertya* Planch. (Ricinocarpeae Müll.Arg., Bertyinae Müll.Arg.)

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Summary

Halford, D.A. & Henderson, R.J.F. (2002). Studies in Euphorbiaceae A.L.Juss., *sens. lat.* 3. A revision of *Bertya* Planch. (Ricinocarpeae Müll.Arg., Bertyinae Müll.Arg.). *Austrobaileya* 6 (2) 187–245. The genus *Bertya* Planch. is endemic in Australia. Twenty-eight species are recognized and a key is provided for their identification. The following species are newly described: *B. calycina* Halford & R.J.F.Hend., *B. ernestiana* Halford & R.J.F.Hend., *B. grampiana* Halford & R.J.F.Hend., *B. granitica* Halford & R.J.F.Hend., *B. lapicola* Halford & R.J.F.Hend., *B. linearifolia* Halford & R.J.F.Hend., *B. recurvata* Halford & R.J.F.Hend., and *B. riparia* Halford & R.J.F.Hend. The new combination *B. virgata* (Ewart) Halford & R.J.F.Hend., based on *Beyeria virgata* Ewart, is made. Three new subspecies are described: *B. cunninghamii* subsp. *pubiramula* Halford & R.J.F.Hend., *B. lapicola* subsp. *brevifolia* Halford & R.J.F.Hend., and *B. tasmanica* subsp. *vestita* Halford & R.J.F.Hend. New species are illustrated, while all taxa are described and mapped, and notes on their distribution, habitat and phenology are given. Lectotypes are chosen for *B. findlayi* F.Muell., *B. polymorpha* Baill., *B. polymorpha* forma *mitchelliana* Baill., *B. polymorpha* forma *rosmarinifolia* Baill., *B. polystigma* Grüning, *B. pedicellata* F.Muell., *B. pinifolia* Planch., *B. pomaderroides* F.Muell., *B. rosmarinifolia* Planch., *Ricinocarpos mitchellii* Sonder and *Croton rosmarinifolius* A.Cunn. An epitype is chosen for *B. polystigma* Grüning. All known synonyms are listed here including phase names that were used to identify taxa prior to their formal naming in this publication.

Key words: Euphorbiaceae, *Bertya*, Australian flora, taxonomy, nomenclature

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Introduction

The genus *Bertya* Planch. is endemic in Australia. It belongs to the family Euphorbiaceae and has representatives in all states but not the Northern Territory. The majority of species occur in eastern Australia (Map 1). Species are mostly perennial shrubs or rarely small trees in mostly open shrubland, woodland or open forest communities, generally in rocky situations on well-drained sandy soils.

Webster (1994) included *Bertya* in subfamily Crotonoideae Pax, tribe Ricinocarpeae Müll.Arg. and subtribe Bertyinae Müll.Arg., together with three non Australian genera namely *Myricanthe* Airy Shaw and *Cocconerion* Baill. from New Caledonia, and *Borneodendron* Airy Shaw from Borneo. However, *Bertya* seems most closely related to *Ricinocarpos* Desf. and *Beyeria* Miq. from which it can be distinguished by the following combination of features: flowers sessile or shortly pedicellate, solitary, paired or in umbelliform clusters terminal on rudimentary, short or variously elongated branches (peduncles) in distal leaf axils, and subtended by several bracts; male flowers with perianth single-whorled and lacking a corolla; female flowers with perianth mostly single-whorled but rarely with a rudimentary corolla; disc absent in both male and female flowers; pollen grains with small sexinous processes; styles 3-lobed with lobes deeply divided.

In 1845, J.E. Planchon described the genus *Bertya* and included five species (*B. pinifolia, B. rosmarinifolia, B. oleifolia, B. gummifera* and *B. cunninghamii*) within it based on material collected by Alan Cunningham and Charles Fraser from eastern Australia in the early 1800's (Planchon 1845). The generic name commemorates the French botanist and horticulturist Count Léonce de Lambertye (1810-1877).

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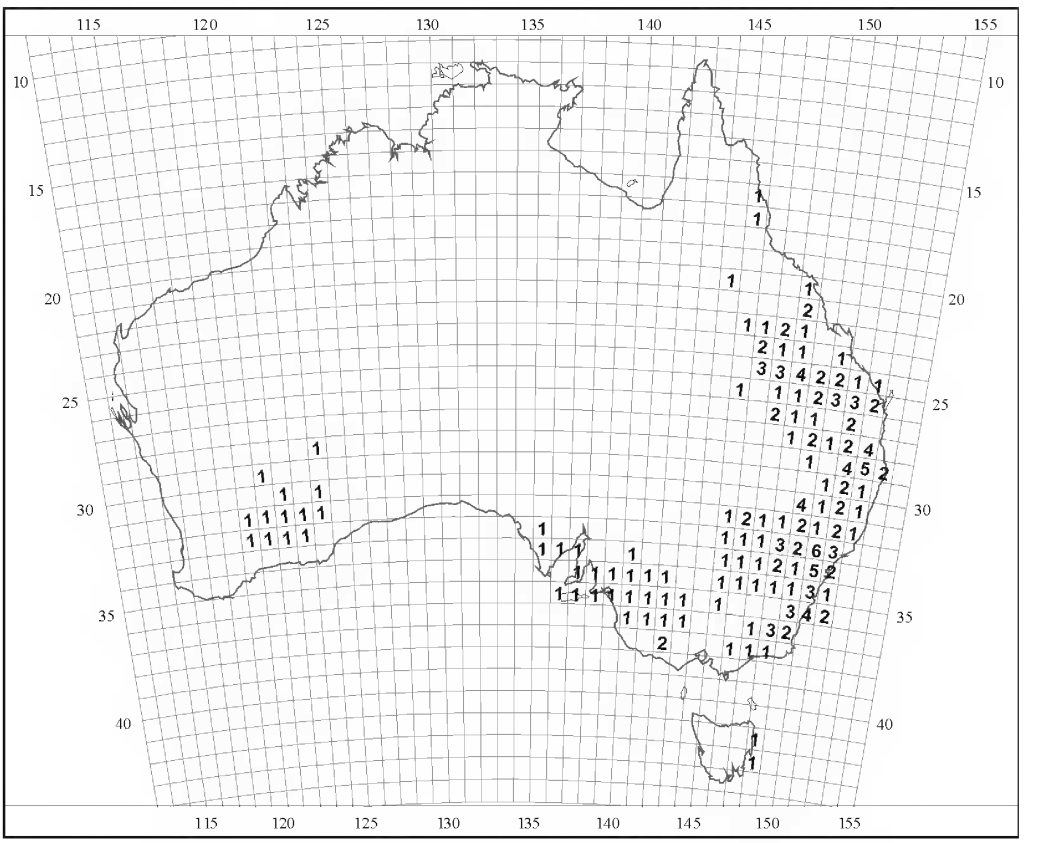

Map 1. Distribution of *Bertya* taxa indicating the number of species in each 1° grid square in Australia.

In De Candolle's Prodromus, J. Müller (1866) enumerated ten species of *Bertya* which he arranged into two informal groups based on leaf shape and the degree of curvature of the leaf margin. Those species with leaves of various outlines but not narrowly linear, and with margins revolute but not all the way to midrib, formed one group which included *B. rotundifolia* F.Muell., *B. pomaderroides* F.Muell., *B. oblongifolia* Müll.Arg. and *B. oleifolia* Planch. Those with linear leaves with margins closely revolute to the midrib formed the second group which included *B. gummifera* Planch., *B. mitchellii* (Sond.) Müll.Arg. (name misapplied; see text), *B. rosmarinifolia* Planch., *B. tasmanica* (Sond. & F.Muell.) Müll.Arg., *B. cunninghamii* Planch. and *B. pinifolia* Planch. The species *B. pedicellata* F.Muell. was overlooked by J. Müller but it would have been placed in the first group.

Seven years later, Bentham (1873) accepted nine species as belonging in *Bertya*, placing *B. tasmanica* and *B. oblongifolia* in synonymy of *B. rosmarinifolia* and *B. pomaderroides* respectively. He did not recognize any subdivisions within the genus and made no comment about J. Müller's informal groups.

The most recent account of *Bertya* as a whole is that of Grüning (1913). Grüning recognized nineteen species within this genus, and grouped them into two sections namely *B.* sect. *Euryphylla* and *B.* sect. *Stenophylla* (= *B.* sect. *Bertya*). These groups were based on leaf shape and the degree of curvature of the leaf margin. This division was essentially the same as that given by J. Müller (1866). Each of Grüning's sections was further divided into two subsections (Table 1). His section *B.* sect. *Euryphylla* was split, principally on

whether or not the flowers are pedicellate and the phyllotaxy of the bracts, into *B.* subsect. *Pedunculatae*, containing *B. pomaderroides, B. oblongifolia, B. findlayi* and *B. brownii,* and *B.* subsect. *Sessiliflorae*, containing *B. rotundifolia* and *B. oppositifolia* (= *B. opponens*). *B.* sect. *Stenophylla* (= *B.* sect. *Bertya*) was split on other differences of leaf shape, and the degree of revolution of the margins, into *B.* subsect. *Recurvae*, containing *B. oleifolia, B. polystigma* Grüning, *B. glandulosa* and *B. pedicellata,* and *B.* subsect. *Acerosae* (= *B.* subsect. *Bertya*), containing *B. gummifera, B. pinifolia, B. rosmarinifolia, B. mitchellii* (name misapplied; see text), *B. cunninghamii, B. dimerostigma, B. tasmanica, B andrewsii* (= *Ricinocarpos stylosus*) and *B. quadrisepala* (= *Ricinocarpos muricatus*).

The number of collections and information relevant to the taxa concerned which has become available since Grüning's work have made it necessary for the current study of the genus to be undertaken so that the account of the genus for the Flora of Australia project is an accurate reflection of the current state of knowledge of it. This paper presents the taxonomic conclusions of our revision of *Bertya* in which we recognize 28 species of *Bertya* of which eight are newly described. The names *B. andrewsii* (= *Ricinocarpos stylosus*) and *B. quadrisepala* (= *Ricinocarpos muricatus*) are excluded from *Bertya* and the misapplication of the name *B. mitchellii* is corrected.

Although we have not critically examined Grüning's sectional and subsectional groupings within *Bertya*, it is our opinion that they are somewhat artificial. Species whose floral morphology suggests a recent shared ancestry would be placed in different subsections. For example, while *B. lapicola* (this revision) and *B. linearifolia* (this revision) fit clearly into his '*B.* subsect. *Acerosae*', the closely related species *B. pedicellata* is included in *B.* subsect. *Recurvae.* However, there are obvious groupings within his '*B.* subsect. *Acerosae*', such as *B. gummifera, B. pinifolia, B. recurvata* (this revision) and *B. granitica* (this revision), that more than likely are representatives of a monophyletic unit within *Beryta.* Such inconsistencies have caused us to abandon the recognition of sections and subsections for this revision. More detailed investigations should clarify the phylogenetic relationships between the *Bertya* species we recognize. Further studies into this genus are currently being undertaken by Mr M. Fatimeh as part of his PhD studies at the University of New England in Armidale.

Table 1. Features of sections and subsections of *Beryta* as set out by Grüning (1913).

Bertya sect. ***Bertya*** **(*Bertya* sect. *Stenophylla* Grüning)**		***Bertya*** sect. ***Euryphylla*** Grüning	
Shrubs. Leaves narrow (linear or obovate-lanceolate), with margin revolute or recurved.		Shrubs or trees. Leaves broad (oblong or elliptic or orbicular), flat or concave.	
Bertya subsect. ***Recurvae*** Grüning	***Bertya*** subsect. ***Bertya*** (***Bertya*** subsect. ***Acerosae*** Grüning)	***Bertya*** subsect. ***Pedunculatae*** Grüning	***Bertya*** subsect. ***Sessiliflorae*** Grüning
Leaves sub-linear or lanceolate, nearly flat, with margin loosely recurved.	Leaves narrow-linear, with margin revolute all the way to midrib.	Flowers pedunculate; leaves shortly petiolate; bracts never opposite.	Male flowers sessile; leaves conspicuously petiolate; bracts 4 or 6, decussate.

Materials and methods

This revision is based on an assessment of morphological characters of about 1200 dried herbarium collections, photographs of types held at BM and CGE and collections and field studies undertaken by the second author from 1988 to 1992 and the first author in 1999 and 2000. Collections from the following herbaria were studied and annotated: AD, BRI, CANB, DNA, HO, K, NSW, MEL, NE and PERTH. The above herbarium acronyms and ones used

in the text to indicate herbaria holding particular specimens follow Holmgren et al. (1990). All specimens citied have been seen unless otherwise indicated (as *n.v.*).

The species treated in the present paper are listed alphabetically. Descriptions of colour of vegetative and floral parts are either from the herbarium labels or from photographs taken by the second author during field studies. Measurements listed are based upon the total variation observed in the herbarium specimens examined. Plant size, flowering and fruiting times and habitat information were obtained from herbarium labels. Common names are given where known. All measurements were made either on fresh or dried material, material preserved in 70% ethanol or dried material reconstituted by placing in boiling water for a few minutes. The morphological data for this revision were recorded using the DELTA system (Dallwitz *et al.* 1993). The distribution maps were produced with MapInfo Version 3 and are based on herbarium specimen locality data.

Taxonomy

Bertya Planchon, *London J. Bot.* 4: 472, t. 16A (1845). **Type:** *Bertya rosmarinifolia* Planch., *fide* G.L. Webster, *Ann. Missouri Bot. Gard.* 81: 110 (1994).

***Derivation of name*:** Named after Count Léonce de Lambertye, French botanist and horticulturist, author of a catalogue of plants of the Marne region of France published in 1847 (Baines 1981).

Monoecious or dioecious shrubs or rarely small trees, often resinous; stems erect or ascending, much branched; branches glabrous or stellate-pubescent, leafy throughout. Leaves exstipulate, sessile or shortly petiolate, alternate rarely opposite, persistent or caducous, glabrous or sparsely hairy and smooth or scabrid adaxially, varyingly pubescent abaxially, with margins entire, recurved or flat and with basi-laminar glands present or rarely absent. Flowers sessile or pedicellate, solitary, paired or in umbelliform clusters, terminal on rudimentary, short or variously elongated branches (peduncles) in distal leaf axils, subtended by several bracts; perianth mostly single-whorled and lacking a corolla or rarely 2-whorled in female flowers with rudimentary corolla; calyx shortly fused proximally, deeply 4 or 5(rarely 6)-lobed, imbricate (quincuncial), somewhat petaloid; disc absent. Male flowers with calyx lobes usually entire; petals absent or if present then rudimentary; stamens numerous, spreading ± perpendicularly from a central column formed by fusion of bases of filaments; anthers of two separate obloid, parallel but contiguous locules terminal on the free apex of each filament, dehiscing by longitudinal slits; vestiges of styles absent. Female flowers with calyx persistent; lobes sometimes enlarging in fruit, entire or somewhat ciliate on margins; petals absent or rudimentary; ovary 3(rarely 2, 4 or 5)-celled with one pendant ovule in each locule; styles 3(rarely 4), shortly fused at base, spreading to ascending throughout or rarely recurved distally, 2 to several-lobed; lobes ± dorsi-ventrally flattened or terete but grooved abaxially. Fruit capsular, usually 1-seeded by abortion, separating septicidally into mostly three 2-valved cocci. Seeds ovoid, ellipsoid or obloid and usually dorsi-ventrally compressed or rarely subglobose, smooth, carunculate; caruncle creamy-white to yellowish-white, waxy-fleshy; endosperm copious; cotyledons ± equal in width to the radicle.

Key to species of *Bertya*

1. Young branchlets glabrous 2
   Young branchlets sparsely to densely stellate-pubescent 9

2. Adaxial surface of leaf lamina glabrous, smooth 3
   Adaxial surface of leaf lamina with stellate hairs or tuberculate 7

3. Leaves appressed to stem, < 4 mm long (W.A.) ..... **28. B. virgata**
   Leaves spreading from stem, > 4 mm long 4

4. Leaf laminas ≥ 2.5 mm wide; margins recurved with most of abaxial surface of leaf lamina visible (Qld) ..... **5. B. ernestiana**
   Leaf laminas < 2.5 mm wide; margins recurved or revolute to midrib so that usually only midrib of abaxial surface is visible 5

5. Leaf laminas lorate or narrowly oblong, ≤ 10 mm long with length/width ratio <10:1 (W.A.) ..... **4. B. dimerostigma**
   Leaf laminas linear, > 10 mm long with length/width ratio >15:1 6

6. Capsule ≥ 8 mm long; leaf laminas 24–55 mm long with apex acute and with a prominent apiculate gland; stamens 55–80 (Qld) ..... **12. B. lapicola**
   Capsule < 8 mm long; leaf laminas 7–27 mm long with apex obtuse to truncate and without a prominent apiculate gland; stamens 15–40 (Qld, N.S.W., Vic.) ..... **3. B. cunninghamii**

7. Calyx lobes of female flowers glabrous (Qld) ..... **22. B. recurvata**
   Calyx lobes of female flowers fimbriate 8

8. Leaf lamina length/width ratio < 25:1, 15–27 × 1.5–2.6 mm (Qld) ..... **9. B. granitica**
   Leaf lamina length/width ratio > 30:1, 25–60 × 0.8–1.5 mm (Qld) ..... **19. B. pinifolia**

9. Leaf lamina margins recurved or revolute to midrib so that usually only midrib of abaxial surface is visible 10
   Leaf lamina margins flat or if recurved then most of the abaxial surface of leaf lamina visible 21

10. Fruiting calyces ≥ two-thirds of capsule length 11
    Fruiting calyces < two-thirds of capsule length 15

11. Female flowers ± sessile; adaxial surface of leaf lamina moderately to densely tuberculate with persistent hair stipes 12
    Female flowers pedicellate; pedicels 1.0–3.5 mm long; adaxial surface of leaf lamina smooth or with scattered tubercules 14

12. Calyx lobes of female flowers glabrous (Qld) ..... **22. B. recurvata**
    Calyx lobes of female flowers fimbriate 13

13. Leaf apices rounded, without apiculate gland (N.S.W.) ..... **10. B. gummifera**
    Leaf apices acute, terminating in an apiculate gland (Qld) ..... **9. B. granitica**

14. Ovary densely stellate-pubescent, not viscid; leaf laminas 19–42 × 1.2–3.1 mm; capsule densely stellate-pubescent (Qld) ..... **2. B. calycina**
    Ovary glabrous or with scattered hairs, viscid; leaf laminas 40–92 × (1.7)3–10 mm; capsule glabrous (Qld) ..... **18. B. pedicellata**

15. Young branchlets viscid, with a sparse indumentum of white stellate hairs 16
    Young branchlets not viscid, with a moderately dense to dense grey-white or golden yellow indumentum of stellate hairs 17

16. Leaf apex rounded to obtuse, not apiculate; leaf laminas < 0.8 mm wide (N.S.W., Qld, Vic.) ..... **3. B. cunninghamii**
    Leaf apex acute, with prominent glandular apiculum; leaves ≥ 0.9 mm wide (N.S.W.) ..... **13. B. linearifolia**

17. Calyx lobes of female flowers glabrous 18
    Calyx lobes of female flowers sparsely to densely stellate-pubescent 19

18. Leaf apex rounded or truncate (N.S.W., Qld) ..... **24. B. rosmarinifolia**
Leaf apex obtuse to acute (N.S.W., S.A., Tas., Vic.) ..... **27. B. tasmanica**

19. Adaxial surface of leaf lamina scabrous, with a moderately dense indumentum of coarse stipitate stellate hairs (N.S.W.) ..... **14. B. mollissima**
Adaxial surface of leaf lamina ± smooth, glabrous or with a sparse to dense indumentum of fine sessile or stipitate stellate hairs 20

20. Adaxial surface of leaf lamina hairy at least when young, glabrescent, not viscid (N.S.W., S.A., Tas., Vic.) ..... **27. B. tasmanica**
Adaxial surface of leaf lamina glabrous, viscid (N.S.W.) ..... **15. B. oblonga**

21. Leaves opposite 22
Leaves spirally alternate 23

22. Young branchlets sparsely to moderately stellate-pubescent, glabrescent; hairs c. 0.1 mm across; calyx lobes of female flowers narrowly ovate to oblong-ovate, 3.2–5.2 × 0.9–1.7 mm; ovary glabrous or with scattered hairs; capsule mostly 1-seeded (Qld) ..... **18. B. pedicellata**
Young branchlets densely stellate-pubescent; hairs 0.2–0.8 mm across, persistent; calyx lobes of female flowers ovate to broadly ovate, 5.0–5.7 × 3.4–5.2 mm; ovary densely hairy; capsule mostly 3-seeded (N.S.W., Qld) ..... **17. B. opponens**

23. Fruiting calyces ≥ two-thirds length of capsule 24
Fruiting calyces < two-thirds length of capsule 26

24. Young branchlets viscid, sparsely to moderately stellate-pubescent, glabrescent; adaxial surface of leaf lamina ± smooth or with scattered tubercules; midrib adaxially viscid, glabrous or not as densely hairy as abaxial surface of leaf lamina 25
Young branchlets not viscid, densely persistent stellate-pubescent; adaxial surface of leaf lamina minutely tuberculate with persistent hair stipes; midrib adaxially not viscid, with indumentum as dense as abaxial surface of leaf lamina (N.S.W., Qld) ..... **16. B. oleifolia**

25. Ovary densely stellate-pubescent, not viscid; leaf laminas linear, 19–42 × 1.2–3.1 mm; capsule densely stellate-pubescent (Qld) ..... **2. B. calycina**
Ovary glabrous or with scattered hairs, viscid; leaf laminas linear-elliptic or linear-obovate, sometimes linear, 40–92 × (1.7)3–10 mm; capsule glabrous (Qld) ..... **18. B. pedicellata**

26. Adaxial surface of leaf lamina glabrous, ± smooth 27
Adaxial surface of leaf lamina sparsely to moderately stellate-pubescent, at least when young, if glabrescent then sparsely to moderately tuberculate with persistent hair stipes 30

27. Peduncles ≥ 7 mm long (N.S.W.) ..... **21. B. pomaderroides**
Peduncles < 7 mm long 28

28. Calyx lobes of female flowers ≤ 2.5 mm long, sparsely to densely stellate-pubescent; leaf laminas 8–23 × 1.3–3.0 mm (N.S.W.) ..... **15. B. oblonga**
Calyx lobes of female flowers > 2.5 mm long, glabrous; leaf laminas 19–46 × 2.5–9.0 mm 29

29. Young branchlets with pale golden-yellow indumentum; petioles 1.5–3.5 mm long; female flowers sessile; calyx lobes of female flowers 4.2–4.6 mm long; capsules 7.5–9.3 mm long (N.S.W., Vic.) ..... **6. B. findlayi**
Young branchlets with whitish coloured indumentum; petioles 0.9–1.5 mm long; female flowers pedicellate with pedicels 0.3–1.1 mm long; calyx lobes of female flowers 2.8–3.2 mm long; capsules 6.7–7.3 mm long (Vic.) ..... **8. B. grampiana**

30. Peduncles ≥ 6 mm long (N.S.W.) ..... **1. B. brownii**
Peduncles < 6 mm long 31

31. Leaf laminas ovate to orbicular, rarely narrowly ovate, with length/width ratio 2:1 rarely 3:1, obtuse to cordate at base 32
Leaf laminas linear to oblong or narrowly obovate or narrowly ovate, with length/width ratio ≥ 4:1, obtuse to attenuate at base 33

32. Leaf laminas ovate to narrowly ovate, 8–22 × 3–10 mm, with apex obtuse to acute; basi-laminal glands stalked, 0.2–0.7 mm long; stamens 45–55 (Qld) ..... **26. B. sharpeana**
Leaf laminas ovate to orbicular, 5–10 × 3–8 mm, with apex obtuse to rounded; basi-laminal glands sessile; stamens 15–30 (S.A.) ..... **25. B. rotundifolia**

33. Abaxial surface of calyx lobes of female flowers sparsely to densely hairy 34
Abaxial surface of calyx lobes of female flowers glabrous 35

34. Calyx lobes of female flowers 2.0–2.7 mm long; leaf laminas 6–24 mm long with adaxial surface densely tuberculate by persistent hair stipes; peduncles 1.0–1.6 mm long (N.S.W.) ..... **14. B. mollissima**
Calyx lobes of female flowers 3.2–4.2 mm long; leaf laminas 21–29 mm long with adaxial surface smooth or sparsely tuberculate by persistent hair stipes; peduncles 1.5–2.5 mm long (N.S.W.) ..... **23. B. riparia**

35. Indumentum on branchlets somewhat coarse, straw-coloured to golden yellow (Qld) ..... **7. B. glandulosa**
Indumentum on branchlets fine, grey-white 36

36. Adaxial surface of leaf lamina with stellate hairs up to 0.1 mm across, glabrescent, remaining finely tuberculate by persistent hair stipes; capsules 7.5–10 × 3.2–3.5 mm; calyx lobes of female flowers 1.5–2.2 mm long; androecium 2.5–4.2 mm long; stamens 30–50 (N.S.W.) ..... **11. B. ingramii**
Adaxial surface of leaf lamina with stellate hairs 0.3–0.6 mm across, glabrescent, ± smooth or with scattered fine tubercules; capsules 5.9–7.1 × 3.5–3.8 mm; calyx lobes of female flowers 1.9–3.1 mm long; androecium 5.0–8.9; stamens 55–75 (Qld) ..... **20. B. polystigma**

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1. Bertya brownii S.Moore, J. Bot. 43: 147/148 (1905). **Type**: Australia. [without date,] *R. Brown* [Iter Australiense 3590] (holo: BM *n.v.*, photo BRI, *fide* G.P. Guymer, Austrobaileya 2(5): 429 (1988); iso: CANB [CANB278440]; MEL [MEL537477]; NSW [NSW194843]; ?iso: MEL [MEL114052]).

Bertya astrotricha Blakely, Contr. New South Wales Natl Herb. 1: 120/121 (1941). **Type:** New South Wales. Connelly's Creek, 1.5 miles [c. 2.4 km] NW of Mt Colah, Jun 1918, *W.F. Blakely* (holo: NSW [NSW194834], photo BRI).

Monoecious or apparently dioecious shrubs to 2 m high. Branchlets ± terete with a moderately dense indumentum of stellate hairs, becoming glabrous with age though remaining sparsely tuberculate by persistent hair bases; hairs stipitate, golden-yellow, 0.7–1.1 mm across, with stipes 0.1–0.8 mm long. Leaves petiolate, spirally alternate, spreading; petiole ± plano-convex, 2.2–4.5 mm long, with a moderately dense stellate-pubescent indumentum up to 0.2 mm thick; lamina narrowly elliptic to elliptic, narrowly obovate or oblong-elliptic, (13–)19–54 mm long,(–4) 9–17 mm wide; adaxial surface green, sparsely hairy with stipitate stellate hairs c. 0.5 mm across, smooth; abaxial surface grey-white or pale green, densely hairy with sessile and stipitate stellate hairs up to 0.9 mm across; margin slightly recurved, sometimes finely sinuate; apex obtuse to rounded; base obtuse to cuneate; midvein impressed adaxially, abaxially raised and angular, stellate-pubescent; marginal glands usually present at base of lamina, 1 each side of midrib, 0.1–0.2 mm across, stipitate with stipes 0.1–0.5 mm long. Inflorescences of a single flower, pedunculate, axillary or terminal on a rudimentary, short branchlet in distal leaf axils; peduncles 8–18 mm long; bracts 4–6, persistent to somewhat caducous, narrowly ovate to linear, 1.5–5.5 mm long, 0.4–1.7 mm wide, rounded at tip, stellate-pubescent abaxially, glabrous adaxially. Male flowers sessile or pedicellate with pedicels up to 1 mm long, ± glabrous; calyx lobes 5(sometimes 6), of unknown colour when fresh, elliptic or ovate-elliptic, 3.1–5.6 mm long, 2.0–3.3 mm wide, rounded or obtuse at tip, glabrous except for scattered stellate hairs along margin and along midline abaxially; androecium 5.3–7.4 mm long, 0.4–0.7 mm across; stamens 56–94; filaments c. 0.1 mm long; anthers 0.8–1.2 mm long. Female flowers pedicellate; pedicels 0.5–2.5 mm long in flower, to 4.0 mm long in fruit, sparsely stellate-pubescent; calyx 5(rarely 6)-lobed, light green; tube 0.2–0.5 mm long; lobes ± equal, erect or sometimes slightly recurved distally, narrowly triangular, 2.2–3.0 mm long, 0.5–0.8 mm wide, acute at the tip, glabrous or with a moderately dense indumentum of stipitate stellate hairs abaxially, glabrous adaxially, with margins entire; petals absent; ovary ellipsoid, 1.5–2.0 mm long, 1.1–1.4 mm across, 3-locular, with a moderately dense indumentum of stellate hairs; style with hairy column 0.1–0.3 mm long and 3 spreading limbs; limbs red, 1.9–5.2 mm long, c. 0.6 mm wide, deeply 2– to 5-lobed; lobes 1.5–4 mm long, 0.2–0.3 mm wide. Capsule narrowly ovoid or ovoid-ellipsoid, 9–9.5 mm long, 3.5–4.2 mm across, with a sparse to moderately dense indumentum of stellate hairs, 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid, 5.5–6.5 mm long, 2.7–3.3 mm wide, 2.3–2.8 mm across, dark brown; caruncle pyramidal, c. 2 mm across, c. 1 mm long, creamy-white.

***Selected specimens (from 27 examined)*: New South Wales.** Deua National Park, peak 3 km due W of Bundogeran Hill, Jan 1993, *Albrecht* 5313 (MEL); Broken Bago, State Forest, NE of Comboyne, Sep 1929, *Bailey* (NSW); junction of northern arm of Mullet Creek, near Wondabyne, Oct 1925, *Blakely* (NSW); Big Bend, Cockle Creek, Hornsby, May 1921, *Blakely & Shiress* (NSW); Cedar Creek, Cowan, Sep 1926 *Blakely & Shiress* (NSW); Dee Why, Apr 1922, *Boorman* (NSW); 1 km NE of Condella, Feb 1996, *Carmen* 181 (CANB); Happy Valley, Glen Davis, Mar 1968, *Constable* [NSW131563] (NSW); Katandra Bushland Sanctuary, Mona Vale, Sep 1984, *Coveny & James* 543 (NSW); Darkey Creek, 128.5 km N of Wilberforce on the Windsor - Singleton road, Oct 1990, *Coveny & Makinson* 14385 (BRI, CANB, MEL, NSW); Stewarts Trail, just E of Big Nellie, Lansdowne S.F., 20 km NNE of Taree, Nov 1997, *Gilmour* PG8023 (BRI); Coondella Fire Trail, Deua National Park, Feb 1984, *Gilmour* 4271 (CANB, NSW); near Falls, Big Nellie Road, Comboyne State Forest, about 25 km direct N of Taree, Nov 1997, *Gilmour* 7998 (BRI); Katandra Bushland Sanctuary, Mona Vale, Jan 1969, *Grieve* (NSW); Katandra Bushland Sanctuary, Jul 1991, *Kennedy & Dart* 98 (NSW); Mona Vale road, Warriewood, Mar 1968, *Lee* (NSW); rhyolite knob 1 km N of Coondella Trig., Deua National Park, Jan 1991, *Rodd et al.* 6153 (BRI, MEL, NSW); Warriewood, Jul 1941, *Rupp* (NSW); Deua National Park, Diamond Creek, above 3rd waterfall, Jan 1994, *Taws & Scott* 356 (BRI, CANB, NSW); Ku-ring-gai Chase National Park, Sep 1995, *Weston & McDougall* 1902 (NSW).

***Distribution and habitat*:** *Bertya brownii* is confined to the coastal and subcoastal districts of New South Wales from near Wauchope southwards to Batemans Bay (Map 2). It is recorded from wet and dry sclerophyll forest communities on shallow sandy soils in shady gullies or on steep hill-slopes.

***Phenology*:** Flowers have been recorded for most months of the year, fruits from September to November and February.

***Affinities*:** *Bertya brownii* closely resembles *B. pomaderroides* but differs from that in having generally larger and thinner leaf laminas with a stellate-pubescent rather than glabrous adaxial surface, and a coarser indumentum on the branchlets and abaxial surface of the leaf lamina which also has two size classes of hairs.

***Notes*:** The Constable collection from Glen Davis cited above [NSW131563] has slightly smaller leaves than are typical for this species.

2. Bertya calycina Halford & R.J.F.Hend. **sp. nov.** affinis *B. glandulosae* Grüning maxime ut videtur sed indumento albo non pallide rufo, foliis petiolo 0.6–1.3 mm non 1.6–3.1 mm longo et lamina lineari non lorata, oblonga vel anguste obovata, floribus femineis calycis lobis concavis non plus minusve planis, accrescentibus post anthesin et fructum includentibus differt. *B. pedicellatae* F. Muell. nonnullis formis affinis sed foliis petiolo 0.6–1.3 mm non 1.5–5.2 mm longo et lamina 19–42 × 2–3.1 mm non 40–92 × (1.7–)3–10 mm, et ovario dense pubescenti non glabro vel sparse pubescenti differt. **Typus:** Queensland. WARREGO DISTRICT: c. 30 km NE of Morven, 28 August 1990, *R.J.F. Henderson et al.* H3380 (holo: BRI; iso: CANB, K, L, MEL, NE, NSW, distribuendi).

Bertya sp. (Winneba D.Jermyn 31), Forster & Halford (2002, p. 69).

Monoecious or dioecious, much branched shrubs to 4 m high, viscid on most parts. Branchlets angular, becoming terete with age, with a sparse to moderately dense indumentum of stellate hairs; hairs ± sessile, white, 0.1–0.4 mm across. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 0.6–1.3 mm long, glabrous, smooth or papillose; lamina linear, 19–42 mm long, 1.2–3.1 mm wide; adaxial surface green, sparsely stellate-pubescent when young, becoming glabrous with age but sparsely tuberculate by persistent hair bases; abaxial surface white, densely hairy with sessile stellate hairs up to 0.2 mm across; margin recurved or sometimes revolute in dried state; apex acute or obtuse to rounded, usually ultimately apiculate with extension from midrib c. 0.1 mm long terminated by a small gland; base obtuse; midvein impressed adaxially, abaxially raised and angular, with scattered stellate hairs on abaxial face and stellate-pubescent laterally; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.2 mm across, sessile. Inflorescences of a single flower or umbelliform with 2 flowers, sessile or pedunculate, axillary or sometimes terminal on a rudimentary, short branchlet in distal leaf axils; peduncles, where present, 4–8 mm long; bracts 2–8, persistent, narrowly ovate to oblong, 2.1–3.7 mm long, 0.9–1.2 mm wide, acute at tip, stellate-pubescent abaxially, glabrous adaxially. Male flowers sessile; calyx lobes 5, light green with a reddish blush distally, elliptic, 2.7–3.2 mm long, 4.2–5.1 mm wide, rounded at tip, glabrous; androecium 3.5–5.0 mm long, 0.7–0.9 mm across; stamens 56–68; filaments 0.1–0.2 mm long; anthers 0.8–1 mm long. Female flowers pedicellate; pedicels 2.5–3.2 mm long, glabrous or with scattered stellate hairs; calyx 5-lobed, pale yellowish-red; tube 0.9–1.1 mm long; lobes ± equal, erect, oblong-elliptic, 3.8–6.4 mm long in flower, to 9.5 mm long in fruit, 1.5–2.5 mm wide, obtuse at tip, glabrous, with margins entire; petals absent or rudimentary where ovate, up to 0.5 mm long and 0.3 mm wide, stellate-pubescent; ovary globose, 1.4–1.8 mm long, 1.4–1.7 mm across, 3(rarely 2)-locular, densely stellate-pubescent; style with hairy column 0.4–0.5 mm long and 3 spreading limbs; limbs dark red, 3.1–6.2 mm long, 0.4–0.7 mm wide, deeply 3– to 5-lobed; lobes 1.7–3.5 mm long, 0.1–0.2 mm wide. Capsule narrowly ellipsoid, 9.0–10.3 mm long, 5.0–6.1 mm across, densely stellate-pubescent, usually 1-seeded; persistent calyx lobes > half the capsule length. Seed obloid, 6.5–7.5 mm long, 3.8–4 mm wide, 2.6–3.0 mm across, dark brown; caruncle pyramidal, 2.8–3.0 mm across, 2.1–2.6 mm long, creamy-white. Fig. 1.

***Additional specimens examined*:** **Queensland.** WARREGO DISTRICT: ridge crossed by boundary between Winneba section of Chesterton Range and SF 11, Sep 1995, *Grimshaw & Bean* PG2201 (BRI); State Forest 11, Orkadilla, Nov 1989, *Jermyn* 31 (BRI).

***Distribution and habitat*:** *Bertya calycina* is confined to an area of sandstone outcrops at

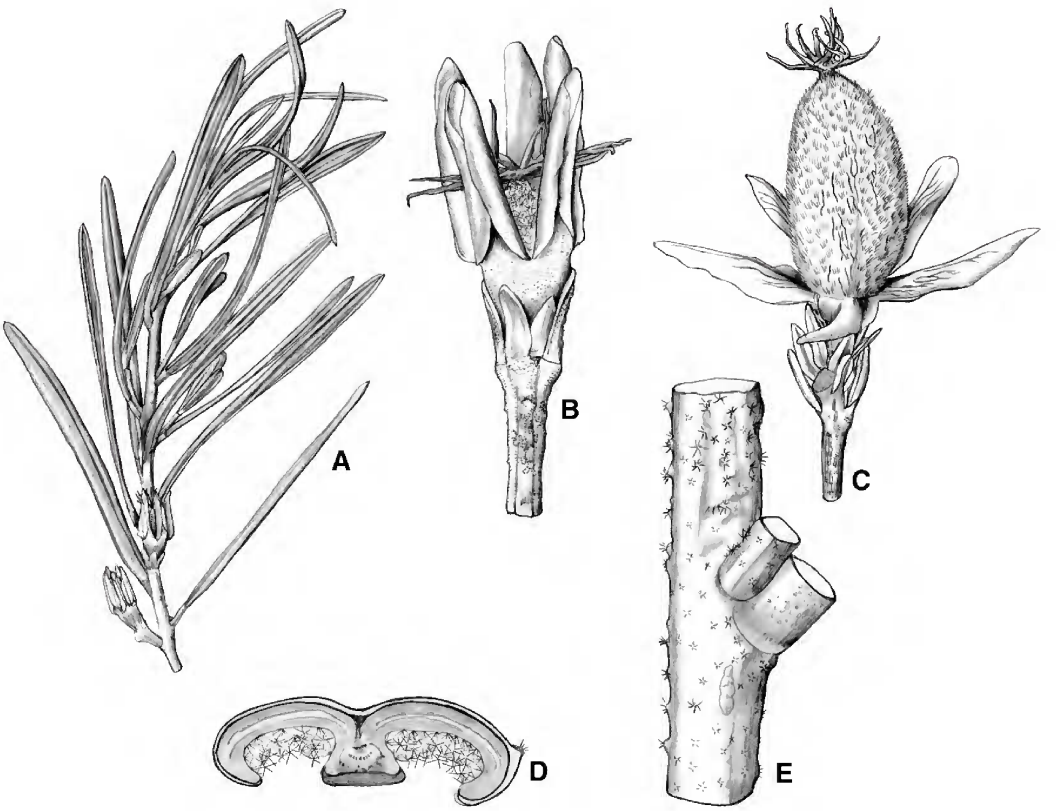

Fig. 1. ***Bertya calycina.*** A. branchlet with fruit. ×1. B. female flower from side. ×4. C. fruit from side. ×3. D. transverse section of leaf. ×16. E. section of branchlet. ×8. A–E from *Henderson* H3380 *et al.* (BRI). Del. W. Smith.

the south-western extremity of the Chesterton Range north-east of Morven, in the south-west of Queensland (Map 3). It grows in mallee woodland communities on shallow sandy to sandy loam soils on the lower slopes and in the gullies around a low sandstone plateau.

***Phenology*:** Flowers have been recorded in August, October and November, fruits in August.

***Affinities*:** *Bertya calycina* seems most closely related to *B. glandulosa* but differs from that by its white rather than pale rusty coloured indumentum, its leaves with shorter petioles (0.6–1.3 mm long compared with 1.6–3.1 mm long) and linear rather than lorate, oblong or narrowly obovate laminas, and in its female flowers with concave rather than more or less flat calyx lobes which enlarge after anthesis and enclose the fruit. *B. calycina* also resembles somewhat some forms of *B. pedicellata* but differs from those by its leaves with shorter petioles (0.6–1.3 mm long compared with 1.5–5.2 mm long) and shorter and narrower laminas (19–42 × 2–3.1 mm compared with 40–92 × (1.7–)3–10 mm), and its densely hairy rather than glabrous or sparsely hairy ovary.

***Notes*:** The only known population of this species consists of about 20 to 30 plants. Though it occurs in a designated State Forest, the area is vulnerable to fire and the plants being resinous increases their susceptibility to elimination. Wild fires in 1992 decreased plant numbers at the site and there was no evidence of regeneration from seed in August of that year.

***Etymology*:** The epithet 'calycina', from Latin

calycinus, with a well-developed calyx, refers to the comparatively enlarged sepals present in both male and female flowers of this species.

3. Bertya cunninghamii Planch., London J. Bot. 4: 273 (1845). **Type:** [New South Wales.] frequent in the western interior quart[er?] of Australia, [without date,] *A. Cunningham* (holo: K (ex herb. Hook.)).

Monoecious, much branched shrubs, 1.5–3m high, viscid on most parts. Branchlets angular, becoming terete with age, glabrous or with a sparse indumentum of stellate hairs, thickly viscid on longitudinal ridges; hairs sessile or stipitate, white, 0.2–0.5 mm across, with stipes up to 0.1 mm long. Leaves petiolate, spirally alternate, spreading; petiole plano-convex,up to 1.0 mm long, glabrous, ± smooth; lamina linear, 8–27 mm long, 0.6–0.9 mm wide; adaxial surface green, glabrous, smooth; abaxial surface white, densely hairy with sessile stellate hairs up to 0.5 mm across; margin recurved to midrib concealing abaxial surface; apex straight or slightly recurved, rounded, obtuse or truncate, usually terminated by small sessile gland; base cuneate; midvein obscure adaxially, abaxially rounded and prominent, ± smooth, glabrous or sparsely stellate-pubescent on abaxial face, stellate-puberulous laterally; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.2 mm across, sessile. Inflorescences of a single flower or sometimes umbelliform with 2 flowers, pedunculate, axillary; peduncles 1.2–1.8 mm long; bracts 4–7, mostly persistent, narrowly oblong to oblong or narrowly ovate, 0.7–1.7 mm long, 0.3–0.7 mm wide, rounded to truncate at tip, ± glabrous. Male flowers sessile or shortly pedicellate; pedicels up to 0.4 mm long, glabrous; calyx lobes 5, yellow-green with reddish blush, ovate, elliptic or oblong elliptic, 2.6–3.7 mm long, 1.5–2.5 mm wide, rounded at tip, glabrous or with scattered hairs on margin; androecium 2.5–4.2 mm long, 0.3–0.8 mm across; stamens 15–56; filaments c. 0.1 mm long; anthers 0.8–1 mm long. Female flowers sessile or pedicellate; pedicels up to 2.5 mm long, glabrous; calyx 5-lobed, light green; tube 0.2–0.4 mm long; lobes ± equal, erect or sometimes recurved distally, ovate, narrowly oblong or oblong-ovate, 1.3–2.0 mm long, 0.9–1.1 mm wide, acute to obtuse or rounded at tip, glabrous, with margins entire or sometimes minutely fimbriate proximally; petals absent or rudimentary, up to 0.4 mm long and 0.3 mm wide, broadly ovate, glabrous; ovary ovoid or ellipsoid, 1.5–1.6 mm long, 0.8–1.1 mm across, 3(rarely 4)-locular, glabrous; style with glabrous column 0.1–0.3 mm long and 3(rarely 4) spreading limbs; limbs red to maroon, 1.2–1.8 mm long, 0.4–0.6 mm wide, deeply 2– or 3-lobed; lobes 0.7–1.3 mm long, 0.1–0.2 mm wide. Capsule ovoid or ellipsoid, 4.8–7.2 mm long, 3.2–4.2 mm across, glabrous, usually 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid or ellipsoid, 3.9–5.7 mm long, 2.2–2.7 mm wide, 1.9–2.4 mm across, light brown and mottled with dark brown and reddish brown; caruncle pyramidal, 1.1–1.8 mm across, 0.8–1.2 mm long, yellowish-white. gooma bush, wallaby bush, sticky Bertya.

***Notes*:** *Bertya cunninghamii*, as recognized here, is widespread in eastern Australia from Bundaberg, Queensland, through New South Wales to Licola, in eastern Victoria. The species exhibits some discontinuous variation in branchlet vestiture, calyx shape and petiole length as well as differences in habitat of occurrence associated with geographical disjunctions. Three subspecies are therefore formally recognized here.

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1. Branchlets sparsely stellate-pubescent ..... **3b. B. cunninghamii** subsp. **pubiramula**
   Branchlets glabrous 2

2. Shrubs to 2 m high; petioles 0.5–1.0 mm long; calyx lobes of female flowers narrowly oblong or oblong-ovate, with margins entire; growing in rocky habitats ..... **3c. B. cunninghamii** subsp. **rupicola**
   Shrubs up to 3 m high; petioles 0.3–0.6 mm long; calyx lobes of female flowers ovate, with margins minutely fimbriate proximally; growing in undulating sandy plains ..... **3a. B. cumminghamii** subsp. **cunninghamii**

3a. Bertya cunninghamii Planch. subsp. **cunninghamii**

Illustration: G.M. Cunningham *et al.* (1982: p. 453).

Shrubs 1.5–3m high; branchlets glabrous. Petioles 0.3–0.6 mm long. Leaf lamina apex rounded. Flowers on peduncles 1.2–1.8 mm long. Male flowers with androecium 3.7–4.2 mm long; stamens 38–56. Female flowers sessile or pedicellate with pedicels up to 2.5 mm long; calyx lobes ovate, acute to obtuse at tip, with margins minutely fimbriate proximally. Seed obloid or ellipsoid, 3.9–5.7 mm long.

***Selected specimens (from 88 examined)*:** **New South Wales.** Charcoal Tank Nature Reserve, S of West Wyalong, Apr 1978, *Blaxell* 1578 (NSW); 3.9 km W of Gubbata on the Naradhan road, Nov 1984, *Coveny & Hind* 12030 (MEL, NSW); Binya State Forest, 1 km N of Griffith to Temora road, Nov 1975, *Crisp* 1654 (AD, CANB); c. 36 km W of Girilambone on dirt road to Canbelego, Oct 1989, *Henderson & Turpin* H3328 (BRI, NSW); c. 6 km W of Weethalle towards Rankine Springs on Mid Western Highway, Sep 1989, *Henderson & Turpin* H3256 (BRI, NSW); c. 7 km E of Naradhan on Naradhan-Gubbata road, Sep 1989, *Henderson & Turpin* H3255 (BRI, CANB, NSW); c. 34 km E of Lake Cargelligo on Condobolin-Lake Cargelligo Road, Sep 1989, *Henderson & Turpin* H3253 (BRI, CANB, NSW); 1 km E of Derriwong on Bogan Gate-Condobolin road, Sep 1989, *Henderson & Turpin* H3251 (BRI, CANB, NSW); c. 3 km S of the Rankine Springs-Goolgowi road, Sep 1989, *Henderson & Turpin* H3262 (BRI, CANB, NSW); c. 57 km NNE of Hillstone towards Matakana on Hillstone to Cobar road, Oct 1989, *Henderson & Turpin* H3324 (BRI, CANB, NSW); Yara Reserve via Condobolin, Oct 1966, *Horne* ANU4220 (CANB); Bundure Station, N of Mt Hope, May 1969, *Martensz* 131 (CANB, NSW); 47 km from Boppy Mountain on road to Girilambone, Apr 1978, *Moore* 7606 (CANB); 6.5 km SW of Tallimba, West Wyalong district, Oct 1972, *Sikkes & Telford* AS502 (CANB); 8 km SE of Mt Hope towards Lake Cargelligo, Oct 1972, *Sikkes & Telford* AS448 (CANB); c. 26 km directly SE of Tullamore, 5 km S of junction with Tullamore-Peak Hill road, Apr 1995, *Taws* 456 (BRI, CANB, NSW); Yara Station, Mt Hope, between Mt Hope and Euabalong, Feb 1964, *Walker* ANU1321 (BRI, CANB, NSW); 25 km SW of Bogan River bridge on "The Range" road, SW of Nyngan, Nov 1984, *Wilson* 6006 (NSW); "Kergunyah", SE of homestead on the boundary fence, Nov 1987, *Wilson & Wilson* 175 (BRI, MEL, NSW).

***Distribution and habitat*:** *Bertya cunninghamii* subsp. *cunninghamii* is confined to central New South Wales from the Cobar and Nyngan areas southwards to the Wyalong district and east to Forbes (Map 4). It commonly grows in woodland or mallee communities dominated by various eucalypts and *Callitris* species on undulating plains on red to red-brown sandy or sandy loam soils.

***Phenology*:** Flowers have been recorded throughout the year, particularly from June to September, fruits from September to May.

3b. Bertya cunninghamii subsp. **pubiramula** Halford & R.J.F.Hend. **subsp. nov.** ab subsp. ceteris *B. cunninghamii* Planch. ramulis pubescentibus non glabris differt. **Typus:** Victoria. by Snowy River, upstream from McKillop's Bridge, 19 September 1979, *N.G. Walsh* 281 (holo: MEL; iso: AD, CANB, NSW).

Shrub to 2 m high; branchlets sparsely stellate-pubescent; hairs sessile or stipitate, white, 0.2–0.5 mm across; stipes up to 0.1 mm long. Petioles 0.1–0.6 mm long. Leaf lamina apex rounded to obtuse. Flowers on peduncles c. 1 mm long. Male flowers with androecium 3.0–4.0 mm long; stamens 18–34. Female flowers pedicellate; pedicels up to 0.8 mm long; calyx lobes narrowly oblong or ovate, rounded to obtuse at tip, with margins fimbriate. Seed not seen.

***Selected specimens (from 25 examined)*:** **New South Wales.** c. 0.5 miles [0.8 km] N of Coolwater Creek, N of Willis and Victoria Border, Aug 1970, *Beauglehole* ACB33881 (AD, CANB, DNA, NSW, MEL); Deua National Park, 2 km ENE of Mongamula Mountain, Jan 1990, *Briggs & Brooker* 2529 (CANB); Coolbaggie Nature Reserve, 12 km ESE of Eumungerie, Aug 1979, *Coveny & Benson* 10427 (NSW); Coolbaggie Nature Reserve, near Eumungerie, Aug 1977, *Morris* (NSW). **Victoria.** Billy Goat Bend, Mitchell River, c. 2.25 miles [3.6 km] NNE of Glenaladale National Park, Apr 1973, *Beauglehole* ACB41764 (MEL, NSW); ridge near Crooked River, 4 miles [c. 6.4 km] N of Dargo Road-Crooked River Road junction, Nov 1957, *Cain* (MEL); near creek at Welcola-Tarralgon High School camp, past Licola (c. 11 km), near Wellington River, Nov 1994, *James* BT191 (MEL); Snowy River, in 1854, *Mueller* (MEL); Razor Back Ridge S of Mt Deddick, May 1962, *Rogers* (MEL); 100-200 m east of Billy Goat Bend Lookout, Mitchell National Park, Mar 1996, *Turner* 1079 (MEL); Cobberas Tingaringy National Park, c. 3 km SE of Sandy Creek on bank of Snowy River, Apr 1989, *Turner* 553 (MEL); Snowy River, 5 km NNW of McKillop's Bridge, Sep 1979, *van Rees* 060 (MEL); Snowy River, Deddick, Sep 1952, *Wakefield* 4698 (MEL); Upper Snowy River, Jan 1948, *Wakefield* 2391 (MEL); Wellington River, c. 11 km (by road) N of Licola, just S of 'Welcola' camp, Dec 1998, *Walsh & Anderson* 4910 (MEL); Snowy River National Park, base of cliff, N face of Mt William, Nov 1996, *Walsh* 4610 (MEL); Upper Snowy River, above McKillop's Bridge, Jan 1948, *Willis* (MEL); Wellington River, 7.5 km N of Licola, Jan 1984, *Yugovic* 20 (MEL).

***Distribution and habitat*:** *Bertya cunninghamii* subsp. *pubiramula* has a disjunct distribution (Map 5). It occurs in New South Wales near Batemans Bay and Dubbo, and in eastern Victoria, from Licola to Cann River. It is recorded mainly from open shrubland communities on shallow sandy soils on rocky outcrops on steep slopes or in riparian habitats. Two collections (*Morris* [NSW195004], NSW and *Coveny & Benson* 10427, NSW) from near Dubbo (Coolbaggie Nature Reserve) are from plants in mallee communities on sandy soils.

***Phenology*:** Flowers have been recorded in August, September and January, fruits from November to February.

***Affinities*:** *Bertya cunninghamii* subsp. *pubiramula* differs from other subspecies of *B. cunninghamii* in having hairy rather than glabrous branchlets.

***Etymology*:** The subspecific epithet is derived from Latin, *pubi-*, softly or weakly hairy, and *ramulus*, branchlet, in reference to the indumentum on the branchlets of this subspecies.

3c. Bertya cunninghamii subsp. **rupicola** Halford & R.J.F.Hend. **subsp. nov.** *B. cunninghamii* Planch. subsp. *cunninghamii* similis ramulis glabris sed statura breviore (ad 1.5 m non 1.5–3 m alta), foliis petiolo leviter longiore (0.5–1.0 mm non 0.3–0.6 mm longo), calycis lobis anguste oblongis ad oblongo-ovatis non ovatis margine integro non minute fimbriato, seminibus parvioribus (3.0–3.5 mm non 3.9–5.7 mm longis) et in locis rupestribus in ripis et montium verticibus non planis arenosis crescens differt. **Typus:** Queensland. MORETON DISTRICT: E of 'Fair Hills', SW of Cooyar, 24 August 1996, *A.R. Bean* 10616 (holo: BRI).

Shrub to 1.5 m high; branchlets glabrous. Petioles 0.5–1 mm long. Leaf lamina apex rounded to truncate or sometimes obtuse. Flowers on peduncles 0.2–1.3 mm long. Male flowers with androecium 2.5–4 mm long; stamens 15–37. Female flowers sessile or shortly pedicellate with pedicels up to 0.8 mm long; calyx lobes narrowly oblong or oblong-ovate, acute to obtuse at tip, with margins entire. Seed ellipsoid, 3.0–3.5 mm long.

***Selected specimens (from 13 examined)*:** **Queensland.** BURNETT DISTRICT: Boondooma Dam, c. 50 km WSW of Murgon, Feb 1999, *Olsen* (BRI). WIDE BAY DISTRICT: Burnett River, adjacent to compartment 32, Cordalba State Forest, WSW of Bundaberg, Aug 1996, *Bean* 10559 (BRI, NSW); Burnett River c. 30 km W of Bundaberg, Aug 1995, *Jansen* (BRI, NSW). DARLING DOWNS DISTRICT: E of 'Fair Hills', SW of Cooyar, Aug 1996, *Bean* 10617 (BRI, NSW). **New South Wales.** Bluff Rock, 37.5 km from Deepwater, Dec 1986, *Beesley & Ollerenshaw* 726 (BRI, CANB, NSW).

***Distribution and habitat*:** *Bertya cunninghamii* subsp. *rupicola* occurs in isolated populations from near Bundaberg, Proston and Cooyar in the south-east of Queensland and from near Glen Innes, in northern New South Wales (Map 6). It is recorded from open shrubland communities on shallow sandy soils in rocky sites on river banks and mountain summits.

***Phenology*:** Flowers have been recorded in May, August and December, fruits in February.

***Affinities*:** *Bertya cunninghamii* subsp. *rupicola* differs from *B. cunninghamii* subsp. *cunninghamii* in having a generally shorter stature (up to 1.5 m high compared with 1.5–3 m high), leaves with slightly longer petioles (0.5–1.0 mm long compared with 0.3–0.6 mm long), narrowly oblong or oblong-ovate rather than ovate calyx lobes, entire rather than minutely fimbriate calyx lobe margins and smaller seeds (3.0–3.5 mm long compared with 3.9–5.7 mm long). This subspecies also grows in different habitats, on rocky sites on river banks and mountain summits in near-coastal areas predominantly east of the Great Dividing Range as opposed to sandplains in inland areas west of the Great Dividing Range.

***Etymology*:** The specific epithet is derived from Latin, *rupes*, rock and *-cola*, dweller or inhabitant, in reference to the rocky habitat of this subspecies.

4. Bertya dimerostigma F.Muell., S. Sci. Rec. 2(5): 98 (1882); *Bertya dimerostigma* F.Muell. var. *dimerostigma*, Grüning in A.Engler, Pflanzenr. H.58: 62 (1913). **Type:** [Western Australia.] Victoria Springs, 30 Sep 1875, [*J.*] *Young* (holo: MEL [MEL114061]; iso: K).

Bertya dimerostigma var. *genuina* Grüning in A.Engler, Pflanzenr. H.58: 62 (1913), *nom. inval.*

Monoecious or sometimes dioecious, much branched shrubs up to 2 m high, mostly viscid. Branchlets ± angular, glabrous, tuberculate or sometimes smooth. Leaves sessile or shortly petiolate, spirally alternate, ascending to spreading; petiole when present ± plano-convex, 0.2–0.5 mm long, glabrous, smooth; lamina lorate or narrowly oblong, 6–10 mm long, 0.9–1.4 mm wide; adaxial surface green, glabrous, ± smooth; abaxial surface white, densely hairy with sessile stellate hairs 0.2–0.3 mm across; margin tightly recurved to midrib concealing abaxial surface of lamina; apex obtuse or rounded, sometimes apiculate with short extension from midrib; base cuneate; midvein obscure or slightly raised adaxially, abaxially raised and angular, sparsely papillate; marginal glands absent or rarely present at base of lamina, 1 each side of midrib, c. 0.1 mm across, sessile. Inflorescences of a single flower, pedunculate, axillary; peduncles 0.5–2 mm long; bracts 5 or 6, persistent, oblong or narrowly ovate, 1–4 mm long, 0.5–0.9 mm wide, acute or obtuse to rounded at tip, glabrous except for scattered stellate hairs on abaxial surface. Male flowers sessile; calyx lobes 5, red, ovate or elliptic, 2.8–5.1 mm long, 2.2–2.7 mm wide, rounded at tip, glabrous except for scattered minute simple hairs on margin; androecium 2.7–3.5 mm long, c. 0.7 mm across; stamens 18–46; filaments 0.1–0.2 mm long; anthers 0.5–0.9 mm long. Female flowers sessile; calyx 5-lobed, of unknown colour when fresh; tube up to 0.4 mm long; lobes ± equal, erect, ovate to broadly ovate, 1.5–3.5 mm long, 1.5–1.8 mm wide, obtuse to rounded or sometimes acute at tip, glabrous, with margins fimbriate; petals absent; ovary ellipsoid, 1.1–1.4 mm long, 1–1.3 mm across, 3-locular, glabrous, minutely verrucose; style with glabrous column c. 0.2 mm long and 3 spreading limbs; limbs yellow-green, 1.1–1.5 mm long, 0.7–0.8 mm wide, deeply 2– to 4–lobed; lobes 0.9–1.1 mm long, 0.3–0.4 mm wide. Capsule ovoid, 6–7 mm long, 3.2–3.5 mm across, glabrous, usually 1–3-seeded; persistent calyx lobes ≤ half the capsule length. Seed ellipsoid or obloid, 3.0–4.5 mm long, 2.3–2.4 mm wide, 2.0–2.4 mm across, light brown and mottled with dark brown; caruncle somewhat pyramidal or disk-like, 1.3–1.8 mm across, 0.2–1 mm long, yellowish-white.

***Selected specimens (from 35 examined)*: Western Australia.** 11 miles [c. 18 km] N of Cundeelee, Jun 1970, *Allan* 274 (AD, MEL, PERTH); *ditto*, Jun 1970, *Allan* 275 (MEL, PERTH); vicinity of Perkolilli Waterhole, Jun 1975, *Beard* 7406 (PERTH); Cundeelee, in 1967, *Boswell* H44 (PERTH); 14 km W of Menzies, Jul 1995, *Cranfield* 9887 (CANB); Coolgardie, in 1901, *Diels* (MEL); "Painted Cliffs", 50 km E of Lake Cronin crossroads, Aug 1980, *George* 15828 (PERTH); Queen Victoria Spring, Sep 1963, *George* 5872 (PERTH); 20 or 25 miles [32 or 40 km] S of Norseman, Oct 1963, *Jefferies* 631015A (K, PERTH); 54 miles [c. 87 km] E of Southern Cross, Oct 1963, *Jefferies* 631009 (K, PERTH); 124 miles [c. 200 km] E of Merredin, Oct 1964, *Jefferies* 641009 (PERTH); 54 miles [c. 87 km] E of Southern Cross, Oct 1963, *Jefferies* 631010 (K, PERTH); 5.2 km W of Zanthus, Oct 1986, *Keighery & Alford* 918 (PERTH); c. 50 m SW of Bushfire Rock Road, 46.5 km E of Hyden, Apr 1991, *Mollemans* 4625 (BRI); 7 miles [c. 11 km] N of Cundeelee, Oct 1956, *Royce* 5508 (PERTH); Queen Victoria Spring, N of Zanthus, Oct 1956, *Royce* 5518 (PERTH); 16 km NE of Gindalbie Homestead, about 70 km NNE of Kalgoorlie, Aug 1968, *Wilson* 7535 (BRI, PERTH); *ditto*, Aug 1968, *Wilson* 7536 (BRI, PERTH); 45 km N of Coolgardie, Oct 1974, *Wittwer* 1353 (PERTH).

***Distribution and habitat*:** *Bertya dimerostigma* is confined to the south-west of Western Australia, from the Merredin and Hyden districts eastward to near Zanthus (Map 7). It grows in hummock grassland, mallee with a tall shrubland understorey, open woodland or open shrubland communities, on white, yellow or red sandy soils often overlying pale grey or red clays.

***Phenology*:** Flowers and fruits have been recorded mostly from June to November, with a few records from January and April.

***Notes*:** The Jefferies (*Jefferies* 631010 (PERTH) and *Jefferies* 631015a (PERTH)) and Mollemans (*Mollemans* 4625 (BRI)) collections cited above differ from other specimens of *B. dimerostigma* seen in having subglobose seeds with a disk-like caruncle rather than obloid seeds with a pyramidal caruncle which are typical for this species. Further collections and field studies are warranted to establish the significance of these differences.

5. Bertya ernestiana Halford & R.J.F.Hend., **sp. nov.** arte affinis *B. pedicellatae* F.Muell. ut videtur sed statura breviore

(ad 1.5 m non 6 m alta), caulibus glabris pustulatis non stellato-pubescentibus, calycis lobis minus quam dimidium non plus quam dimidium longitudinem capsulae, et floribus ut videtur semper solitariis in quaque inflorescentia differt. **Typus:** Queensland. MORETON DISTRICT: Mt Ernest, Mt Barney National Park, 26 September 1999, *D.A. Halford* Q3801 (holo: BRI; iso: K, MEL, NSW, distribuendi).

Bertya sp. (Mt Ernest G.Leiper AQ507685), Forster & Halford (2002, p. 69).

Monoecious, much branched shrubs up to 1.5 m high, thinly viscid on young shoots and buds. Branchlets angular, glabrous, sparsely pustulate. Leaves petiolate, spirally alternate, spreading; petiole bi-convex, 2–4 mm long, glabrous, smooth; lamina linear to linear-elliptic, 40–80 mm long, 3–6 mm wide; adaxial surface green, glabrous except for isolated minute peltate scales, smooth, viscid; abaxial surface white, densely hairy with sessile stellate hairs up to 0.3 mm across; margin slightly recurved; apex acute, ultimately apiculate with pale brown extension from midrib c. 0.1 mm long terminated by a small gland; base attenuate; midvein slightly impressed adaxially, abaxially raised and angular, glabrous and smooth on abaxial face, stellate-pubescent laterally; marginal glands sometimes present at base of lamina, 1 each side of midrib, c. 0.1mm across, stipitate with stipe 0.1–0.2 mm long. Inflorescences of a single flower, pedunculate, axillary or sometimes terminal on rudimentary, short branchlet in distal leaf axils; peduncles 1–5 mm long; bracts 4–6, persistent but deciduous before the fruit matures, linear or narrowly triangular, 2–10 mm long, 0.3–1.3 mm wide, acute, obtuse or rounded at tip, glabrous or stellate-pubescent abaxially, glabrous adaxially. Male flowers sessile; calyx lobes 5, light green, ovate or oblong-ovate, 5.2–5.5 mm long, 2.6–3.5 mm wide, rounded at tip, glabrous; androecium 6.0–7.0 mm long, 0.9–1.0 mm across; stamens c. 60; filaments up to 0.2 mm long; anthers 0.8–1.1 mm long. Female flowers pedicellate; pedicels 1.0–2.1 mm long in flower, to 4.0 mm long in fruit, glabrous; calyx 5-lobed, light green coloured; tube c. 0.3 mm long; lobes ± equal, erect and revolute distally, narrowly oblong-ovate, 3.7–4.5 mm long, 1.0–1.5 mm wide, acute to rounded at tip, glabrous, with margins entire; petals absent or rudimentary where narrowly ovate, up to 0.8 mm long and 0.1 mm wide, glabrous; ovary ovoid, 1.3–2.0 mm long, 0.8–1.3 mm across, 3(rarely 4)-locular, glabrous, smooth; style with glabrous column 0.2–0.3 mm long and 3 spreading limbs; limbs yellow-green to red, 2.9–4.1 mm long, 0.6–0.7 mm wide, deeply 3– to 5-lobed; lobes 3.0–4.1 mm long, 0.2–0.3 mm wide. Capsule narrowly ellipsoid to narrowly ovoid, 7.5–10 mm long, 3.8–4.2 mm across, glabrous, usually 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid-ellipsoid, c. 6 mm long, c. 3.2 mm wide, c. 3 mm across, light brown; caruncle pyramidal, 2.2–2.4 mm across, 2.3–2.4 mm long, creamy-white. Fig. 2.

***Additional specimens examined*: Queensland.** MORETON DISTRICT: Mt Ernest, Apr 1993, *Forster & Leiper* PIF13258 (BRI); *ditto*, Sep 1991, *Leiper* (BRI, NSW); *ditto*, Jul 1992 *Leiper* (BRI).

***Distribution and habitat*:** *Bertya ernestiana* is known only from Mount Ernest in the south-east of Queensland (Map 8). It grows on skeletal sandy loam soils derived from rhyolite on steep rocky slopes and rock pavements in heath or open eucalypt forest with heath understorey.

***Phenology*:** Flowers and fruits have been recorded in April, July and September.

***Affinities*:** *Bertya ernestiana* seems most closely related to *B. pedicellata* but differs from that in its smaller stature, reaching only about 1.5 m high rather than up to 6 m high, its glabrous, pustulate rather than stellate-pubescent stems, and its calyx lobes being less than half the length of the capsule rather than exceeding half the length of the capsule. *B. ernestiana* also appears never to have more than one flower per inflorescence, whereas *B. pedicellata* sometimes has 2 flowers per inflorescence.

***Etymology*:** The specific epithet refers to Mount Ernest in south-east Queensland where the type for the species' name was collected.

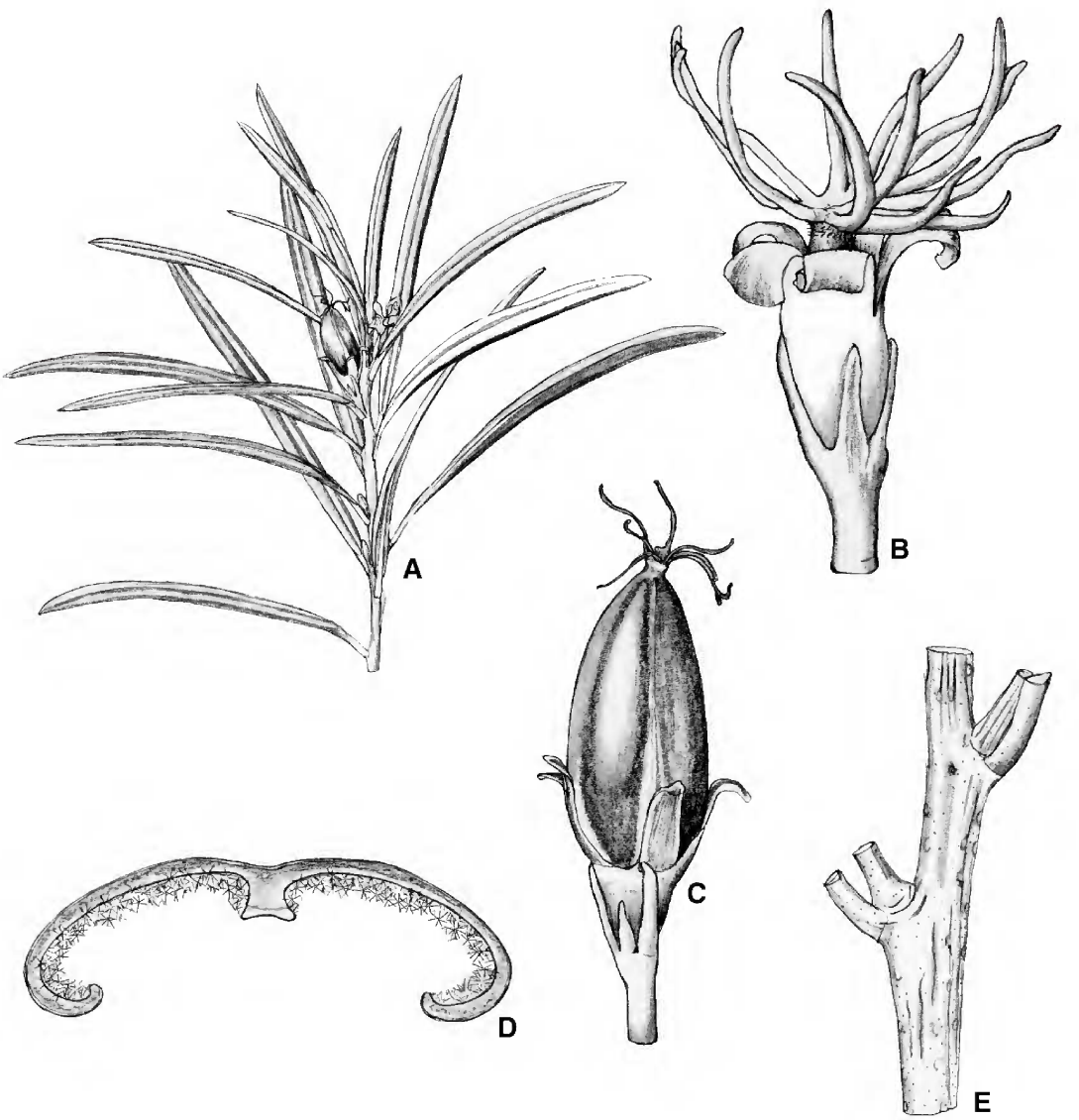

Fig. 2. ***Bertya ernestiana.*** A. branchlet with flowers and fruit. ×1. B. female flower from side. ×6. C. fruit from side. ×6. D. transverse section of leaf. ×18. E. section of branchlet. ×4. A–E from *Leiper* [AQ507685] (BRI). Del. W. Smith.

6. Bertya findlayi F.Muell., Fragm. 8: 141/142 (1874). **Type:** [Australia.] Upper Hume River, Jan 1874, [*F. Mueller*] (lecto, here chosen: MEL [MEL114064]; isolecto: MEL [MEL114295], NSW [NSW194876]).

Monoecious (sometimes predominantly either female or male), much-branched shrubs up to 2 m high, viscid on flower buds and young shoot tips. Branchlets ± angular, becoming terete with age, with a dense indumentum of stellate hairs, becoming glabrous with age, though remaining minutely tuberculate by persistent hair bases; hairs ± sessile, pale golden-yellow, 0.1–0.4 mm across. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 1.5–3.5 mm long, glabrous and slightly longitudinally grooved adaxially, with a dense stellate-pubescent indumentum up to 0.1 mm thick abaxially; lamina narrowly oblong, narrowly obovate or lorate, 20–46 mm long, 4–9 mm wide; adaxial surface green, glabrous, smooth; abaxial surface white, densely hairy with ± sessile stellate hairs up to 0.4 across; margin recurved; apex obtuse, rounded or truncate, usually ultimately apiculate with minute yellowish coloured extension from mibrib, terminated by a small gland; base cuneate to attenuate; midvein impressed adaxially, abaxially raised, angular and stellate-pubescent on all surfaces; marginal glands present at base of lamina, 1 each side of midrib, c. 0.1 mm across, sessile. Inflorescences of a single flower or rarely umbelliform with 3 flowers, pedunculate, axillary or sometimes terminal on rudimentary, a short branchlet in distal leaf axils; peduncles 3–6 mm long; bracts 4 or 5, persistent; outer bracts narrowly ovate or triangular, 1.8–2.7 mm long, 0.8–1.1 mm wide, acute at tip, stellate-pubescent abaxially, glabrous adaxially; inner bracts broadly ovate to orbicular, 1.8–2.4 mm long, 1.5–2.4 mm wide, acuminate at tip, glabrous or stellate-pubescent along midline abaxially. Male flowers sessile; calyx lobes 5, light green, ovate, 3.5–4.6 mm long, 2.5–3.3 mm wide, obtuse to rounded at tip, glabrous; androecium c. 4 mm long, c. 0.8 mm across; stamens 35–41; filaments c. 0.1 mm long; anthers 0.9–1.1 mm long. Female flowers sessile; calyx 5-lobed, light green coloured; tube c. 0.5 mm long; lobes equal, erect, recurved to revolute distally, narrowly ovate or somewhat narrowly triangular, 4.2–4.6 mm long, 1.9–2.2 mm wide, acute at tip, glabrous, with margins entire; petals absent; ovary ellipsoid, 2.5–3 mm long, 1.9–2.2 mm across, 3-locular, with a moderately dense indumentum of stellate hairs distally; style with glabrous column 0.2–0.5 mm long and 3 spreading limbs; limbs red, 2.1–2.7 mm long, 0.5–0.6 mm wide, deeply 3-lobed; lobes 0.6–1.9 mm long, 0.1–0.2 mm wide. Capsule narrowly ovoid or ellipsoid, 7.5–9.3 mm long, 3.9–5.2 mm across, glabrous or with scattered stellate hairs distally, usually 1-seeded; persistent calyx lobes ≤ to half the capsule length. Seed obloid, 5.2–6.6 mm long, 3.2–4.1 mm wide, 2.7–3.4 mm across, brown and mottled with reddish brown and light brown; caruncle disk-like, c. 2.1 mm across, c. 1 mm long, yellowish-white. mountain Bertya

***Selected specimens (from 17 examined)*: New South Wales.** c. 500 m NNW of Alpine Way bridge, Swampy Plains River, Kosciusko National Park, Oct 1987, *Davies* 182 (CANB, NSW); *ditto*, Jan 1988, *Davies & Walton* 452 (CANB, NSW); Geehi River track above Pinnacle, Jan 1959, *Ford* (NSW); Geehi River track, Snowy River, Sep 1954, *Mueller & Phillips* 2223 (NSW); Khancoban Back Creek, Geehi region below S.M.A. camp, Jan 1961, *Phillips* (CANB, NSW); Bogoing Creek track, Geehi Region, Oct 1957, *Phillips & Roeder-Roitzsch* (NE); Jacobs (Tongaroo) River, near road bridge, Nov 1968, *Rogers* (MEL); Apline Way, c. 10 km SE from Khancoban, Feb 1992, *Walsh* 3412 (MEL); Barry Highway at Jacobs River Crossing, Snowy River Valley, Nov 1968, *Willis* (MEL). **Victoria.** Surveyor's Creek, just upstream from junction with Tin Mine Road, Oct 1982, *Frood* (MEL).

***Distribution and habitat*:** *Bertya findlayi* is confined to the south-east of New South Wales from Khancoban to the Snowy River, to the north-east of Victoria near Corryong (Map 9). It grows in wet or dry sclerophyll forest communities dominated by *Eucalyptus albens* Benth. and *Callitris* sp. on sandy loam soils along watercourses and in gullies.

***Phenology*:** Flowers have been recorded in September and October, fruits in October, November, January and February.

***Typification*:** Four sheets of probable type material of *Bertya findlayi* have been located. All sheets have the species name in Mueller's hand written on them. Two sheets are at MEL with one sheet each at K and NSW. Although all the material appears to be from the one

collection, the sheet at K is labelled "base of Mt Kosciuska" while the remaining sheets are labelled "Upper Hume River, January 1874". Sheet MEL114064 at MEL is chosen here as the lectotype as it is the most ample of these specimens.

7. Bertya glandulosa Grüning in A.Engler, Pflanzenr. H.58: 59 (1913). **Type:** [Queensland.] Wallangarra, Oct 1901, *J. Boorman* (holo: W; iso: NSW [NSW194893]).

Monoecious or dioecious, much branched shrubs up to 2 m high, thickly viscid on floral buds and leaf lamina margins, less so on adaxial lamina surface. Branchlets ± angular with a dense indumentum of stellate hairs; hairs sessile, straw-coloured, up to 0.5 mm across. Leaves petiolate, spirally alternate, ascending to spreading; petiole plano-convex, 1.6–3.1 mm long, with a dense stellate-pubescent indumentum up to 0.2 mm thick; lamina narrowly oblong to lorate or rarely narrowly obovate, 10–27 mm long, 1.5–3.2 mm wide; adaxial surface green with a sparse to moderately dense indumentum of stalked stellate hairs, glabrescent, tuberculate with persistent hair bases; abaxial surface white, densely hairy with ± sessile stellate hairs up to up to 0.3 mm across; margin revolute; apex obtuse to rounded, ultimately apiculate with an extension from midrib up to 0.1 mm long and terminated with a light brown to red gland; base shortly cuneate; midvein impressed adaxially, abaxially raised, angular and pubescent with sessile and stipitate stellate hairs; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.15 mm across, sessile or stipitate with stipes up to 0.2 mm long. Inflorescences of a single flower, pedunculate, axillary; peduncles up to 1.5 mm long; bracts 4–6, persistent but deciduous before fruit matures, narrowly ovate to ovate, 1.5–2.5 mm long, 0.5–0.9 mm wide, acute at tip, glabrous or stellate-pubescent abaxially, glabrous adaxially. Male flowers shortly pedicellate; pedicels 0.5–0.8 mm long, glabrous; calyx lobes 5, yellow-green, oblong-elliptic, 3.1–3.7 mm long, 1.8–2.1 mm wide, rounded at tip, glabrous; androecium 2.0–3.0 mm long, 0.4–0.5 mm across; stamens 25–30; filaments c. 0.1 mm long; anthers 0.7–0.9 mm long. Female flowers sessile; calyx 5-lobed, yellow-green coloured; tube 0.4–0.6 mm long; lobes ± equal, erect, recurved distally, ovate to oblong-ovate, 1.8–2.2 mm long, 0.7–1.2 mm wide, acute or obtuse to rounded at tip, glabrous, with margins entire; petals absent or rudimentary when up to 0.6 mm long and 0.3 mm wide, ovate, glabrous; ovary ellipsoid, 1.3–1.6 mm long, 1.4 mm across, 3-locular, densely stellate-pubescent; style with hairy column 0.1–0.2 mm long and 3 spreading limbs; limbs red, 1.3–3.4 mm long, deeply 3– to 5-lobed; lobes 1.1–3.2 mm long, 0.2–0.3 mm wide. Capsule narrowly ellipsoid, 7–8 mm long, 3.7–4.2 mm across, with a moderately dense indumentum stellate hairs, usually 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid-ellipsoid, 5.4–6.1 mm long, 3.6–3.9 mm wide, 3.3–3.8 mm across, dark red; caruncle pyramidal, 2.4–2.7 mm across, 1.1–1.4 mm long, creamy-white.

***Selected specimens (from 13 examined)*: Queensland.** DARLING DOWNS DISTRICT: Bald Mountain, SW section of Girraween National Park, Jan 1995, *Bean* 8222 (BRI); Wallangarra, Oct 1901, *Boorman* (NSW); Wyberba, Portion 90, Jan 1993, *Forster & Halford* PIF12631 (BRI); *ditto*, Sep 1993, *Forster & Bean* PIF13850 (BRI); 3.3 km SE of Glen Aplin, Sep 1974, *Gittins* 2794 (BRI); ridge S of Bald Mountain, Girraween National Park, Sep 1994, *Grimshaw & Turpin* PG971 (BRI); 6 km W of Glen Aplin, portion 87, Stalling Lane, Jun 1994, *Halford & Grimshaw* Q2192 (BRI, NSW); 18 km SW of Stanthorpe, Oct 1994, *Halford* Q2293C (BRI); Mt Norman, c. 5 miles [8 km] NE of Wallangarra, Dec 1970, *Hockings* (BRI).

***Distribution and habitat*:** *Bertya glandulosa* is confined to the Stanthorpe-Wallangarra area in the south-east of Queensland (Map 10). It is recorded as growing in open eucalypt woodland, eucalypt/*Callitris* woodland or dense to open shrubland communities on shallow sandy soils on granite rock pavements and between granite boulders.

***Phenology*:** Flowers have been recorded in January, June, August to October and December, fruits in January and June.

***Affinities*:** *Bertya glandulosa* is somewhat similar in stature and leaf size to *B. oblonga* with which it has been confused in the past. *B. glandulosa* differs from *B. oblonga* by having a sparse to moderately dense indumentum on the adaxial surface of young leaf laminas, and ovate to oblong-ovate rather

than narrowly triangular calyx lobes in female flowers which are glabrous rather than stellate-pubescent on the abaxial surface.

***Notes*:** A Grieves collection from 'Whiteman Creek', just N of Grafton (*Grieves* [NSW194912] (NSW)), is noted here because it is similar to *B. glandulosa* in that it has a moderately dense rusty-brown indumentum of coarse stellate hairs on its branchlets and its adaxial leaf lamina surface is sparsely tuberculate from persistent hair bases. However, it differs by having linear leaves (about 30 mm long × 1.5 mm wide), with margins revolute to the midrib. Even from this single specimen, it is clear that the entity it represents warrants formal recognition. However, study of more collections of it are required before this can be undertaken.

8. Bertya grampiana Halford & R.J.F.Hend. **sp. nov**. arte affinis *B. findlayi* F.Muell. sed ramulorum indumento longiore et molliore, foliis petiolis brevioribus (0.9–1.5 mm non 1.5–3.5 mm longis), et laminis marginibus plus recurvis et plus attenuatis ad basem et apicem, floribus femineis pedicellatis non sessilibus in pedunculis brevioribus (1–4 mm non 3–6 mm longis), calycis lobis parvioribus (2.8–3.2 × 0.8–1.2 mm non 4.2–4.6 × 1.9–2.2 mm) et fructu parviore (6.7–7.3 × 3.2–3.6 mm non 7.5–9.3 × 3.9–5.2 mm) differt. In additamentis haec species affinis *B. ingramii* T.A.James sed pilis grossioribus in ramulis, foliis petiolis brevioribus (0.9–1.5 mm non 2.1–3.2 mm longis), et laminis laevibus non minute tuberculatis adaxialiter, et floribus femineis calycis lobis longioribus (2.8–3.2 mm non 1.5–2.2 mm longis) et ovario plus minusve glabro non dense stellato-pubescentibus differt. **Typus:** Victoria. Grampians, W foot of Victoria Range, Deep Creek, c. 0.5 miles [0.8 km] S from Cave of Hands, 11 November 1974, *J.H. Willis* (holo: MEL [MEL612505]).

***Illustration*:** L. Costermans (1986: p. 211) as *Bertya findlayi*.

Monoecious, much branched shrubs up to 4 m high, viscid on young shoots, flower buds and adaxial leaf lamina surfaces. Branchlets ± terete, with a dense indumentum of stellate hairs, becoming glabrous with age though remaining minutely tuberculate by persistent hair bases; hairs sessile or stipitate, white, 0.4–0.6 mm across, with stipes 0.3–0.5 mm long. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 0.9–1.5 mm long, glabrous and slightly grooved adaxially, with a dense stellate-pubescent indumentum up to 0.3 mm thick abaxially; lamina lorate, linear-obovate or narrowly obovate, 19–39 mm long, 2.5–4.4 mm wide; adaxial surface green, glabrous, smooth; abaxial surface white, densely hairy with sessile or shortly stipitate stellate hairs 0.2–0.5 mm across; margin recurved; apex acute to obtuse; base attenuate to cuneate; midvein impressed adaxially, abaxially raised, rounded, stellate-pubescent on all surfaces; marginal glands present at base of lamina, 1 each side of midrib, c. 0.1 mm across, sessile. Inflorescences of a single flower, pedunculate, axillary or terminal on a rudimentary, short branchlet in distal leaf axils; peduncles 1-4 mm long; bracts 5–7, persistent, narrowly ovate or narrowly triangular, 1–3.5 mm long, 0.3–1.5 mm wide, acute at tip, stellate-pubescent or glabrous abaxially, glabrous adaxially. Male flowers sessile or shortly pedicellate with pedicels up to 0.5 mm long, glabrous; calyx lobes 5, light green, ovate or ovate-elliptic, 4.7–5.1 mm long, 2.4–2.6 mm wide, obtuse to rounded at tip, glabrous; androecium 3.7–6.2 mm long, 0.3–0.6 mm across; stamens 43–49; filaments 0.1–0.3 mm long; anthers 0.9–1.1 mm long. Female flowers pedicellate; pedicels 0.3–1.1 mm long, glabrous; calyx 5(rarely 6)-lobed, light green coloured; tube c. 0.3 mm long; lobes equal, erect or sometimes spreading distally, narrowly ovate or narrowly triangular, 2.8–3.2 mm long, 0.8–1.2 mm wide, acute or obtuse at tip, glabrous, with margins entire; petals absent; ovary ellipsoid distally, 1.6–2.0 mm long, 1.1–1.5 mm across, 3-locular, glabrous or with scattered stellate hairs, smooth or sometimes verrucose; style with glabrous column 0.2–0.4 mm long and 3 spreading limbs; limbs red, 1.8–3.1 mm long, 0.3–0.8 mm wide, deeply 2– to 5-lobed; lobes 0.9–1.5 mm long, 0.1–0.2 mm wide. Capsule narrowly ellipsoid, 6.7–7.3 mm long, 3.2–3.6 mm across, glabrous or with scattered stellate hairs, usually 1-seeded; persistent calyx lobes ≤ half the capsule length.

Seed obloid, 5.5–5.7 mm long, 2.6–2.9 mm wide, 2.5–2.6 mm across, grey-white to light brown and mottled with dark brown; caruncle hemispherical, 1.6–1.9 mm across, 1–1.2 mm long, yellowish-white. mountain Bertya Fig. 3.

***Additional specimens*: Victoria.** Deep Creek, Billywing area, Victoria Range, Jan 1969, *Beauglehole* ACB30288 (MEL); *ditto*, Feb 1959, *Beauglehole* ACB4815 (MEL, NSW); Deep Creek, Victoria Range, Feb 1960, *Beauglehole* ACB4983 (CANB, MEL); Deep Creek, W side of Victoria Range, Apr 1957, *Beauglehole et al.* ACB4099 (AD, MEL); beside Deep Creek, W side of Victoria Range, Feb 1957, *Finck & Beauglehole* ACB4051 (MEL); Grampians National Park, Victoria Range, Deep Creek, Oct 1993, *Read* (MEL); Deep Creek, Victoria Range, Sep 1981, *Scarlett* 81-108 (CANB); 9 km SE of Glenisla, Deep Creek, Victoria Range, Sep 1981, *Scarlett* 81-107 (CANB); Deep Creek, Western Victoria Range, Oct 1988, *Westaway* 553 (MEL); west foot of Victoria Range, Deep Creek c. 0.5 miles [0.8 km] S from Cave of Hands, Nov 1974, *Willis* (MEL); Deep Creek, 5.5 miles [c. 9 km] SE of Glenisla, Jan 1964, *Willis* (MEL).

***Distribution and habitat*:** *Bertya grampiana* is confined to the Victoria Range in The Grampians, western Victoria (Map 11). It grows in riparian shrubland communities on shallow dark grey fine sandy soils associated with sandstone outcropping.

***Phenology*:** Flowers have been recorded between September and February, fruits in November, January and February.

***Affinities*:** Specimens of *Bertya grampiana* have previously been misidentified as *B. findlayi* with which this species is closely allied. *B. grampiana* can be distinguished from *B. findlayi* by its longer and softer white indumentum on the branchlets, leaves with shorter petioles (0.9-1.5 mm compared with 1.5–3.5 mm long) and leaf laminas with more strongly recurved margins and more attenuate at base and tip, and shortly pedicellate rather than sessile female flowers on shorter peduncles (1–4 mm compared with 3–6 mm long), with smaller calyx lobes (2.8–3.2 × 0.8–1.2 mm compared with 4.2–4.6 × 1.9–2.2 mm), producing smaller fruit (6.7–7.3 × 3.2–3.6 mm compared with 7.5–9.3 × 3.9–5.2 mm). *B. grampiana* also resembles *B. ingramii* but differs from that in having coarser hairs on branchlets, leaves with shorter petioles (0.9–1.5 mm long compared with 2.1–3.2 mm long) and a smooth rather than minutely tuberculate adaxial leaf lamina surface, and female flowers with longer calyx lobes (2.8–3.2 mm long compared with 1.5–2.2 mm long) and a ± glabrous rather than a densely stellate-pubescent ovary.

***Etymology*:** The specific epithet is derived from The Grampians area in Victoria where this species occurs.

9. Bertya granitica Halford & R.J.F.Hend. **sp. nov.** arte affinis *B. pinifoliae* Planch. ut videtur sed foliis laminis brevioribus et proportione latioribus (l/w ratio 25:1 non 30:1), floribus femineis calycis lobis majoribus (3.0–5.0 × 1.7–3.0 mm non 2.9–3.6 × 1.3–1.9 mm), fructibus majoribus (8.1–9.0 × 4.5–5.0 mm non 7.0–7.5 × 3.2–3.5 mm), et seminibus majoribus (6.5–6.7 × 3.6–3.7 × 3.0–3.1 mm non 4.7–5.2 × 2.7–2.8 × 2.3–2.4 mm) differt. In additamentis haec species affinis *B. recurvatae* Halford & R.J.F.Hend. et *B. gummiferae* Planch. Ab illa foliis laminis non distaliter recurvatis et floribus femineis calycis lobis marginibus ciliatis non integris differt. Ab haec foliis laminis acutis glande apiculata ad apicem non rotundatis et glandem ad apicem carens differt. **Typus:** Queensland. Burnett District: Beeron Holding, 15 September 1999, P.I. *Forster & T. Ryan* PIF19607 (holo: BRI; iso: MEL, NSW, distribuendi).

Bertya sp. (Beeron Holding P.I.Forster+ PIF5753), Forster & Halford (2002, p. 69).

Monoecious or rarely dioecious, much branched shrubs to 1 m high, viscid on young shoots and flower buds. Branchlets somewhat angular, becoming ± terete with age, glabrous or rarely sparsely stellate-pubescent on young shoots, soon becoming glabrous, tuberculate; hairs stipitate, white, c. 1 mm across, with stipes up to 0.1 mm long. Leaves petiolate, spirally alternate, ascending to spreading; petiole plano-convex, 0.5–1.2 mm long, glabrous or with a sparse indumentum of stellate hairs, up to 0.1 mm thick, smooth or sparsely tuberculate; lamina linear, 20–45 mm long, 1.3–3 mm wide; adaxial surface bright green, sparsely stellate-pubescent when young,

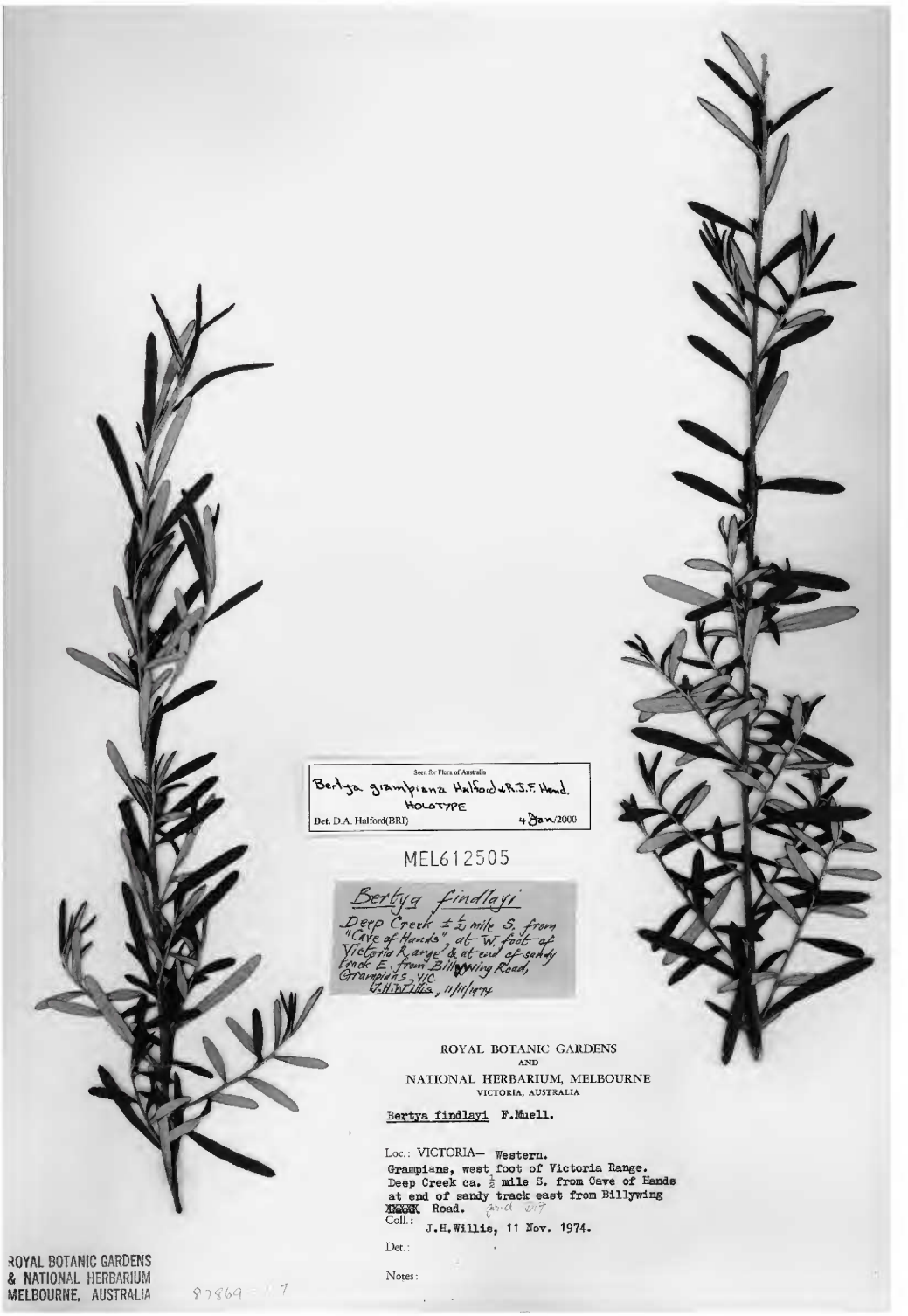

Fig. 3. Type of ***Bertya grampiana***.

glabrescent, tuberculate; abaxial surface white, densely hairy with ± sessile stellate (up to 0.6 mm across) and simple glandular (up to 0.05 mm long) hairs; margin recurved or revolute to midrib concealing lower leaf surface; apex subacute to obtuse, ultimately apiculate with extension from midrib up to 0.1 mm long, terminated with small brown gland; base cuneate; midvein impressed adaxially (sometimes only proximally), abaxially raised and angular, with stellate hairs on abaxial face, becoming glabrous, tuberculate with persistent hair bases, stellate-pubescent laterally; marginal glands present at base of lamina, 1 each side of midrib, 0.3–0.4 mm across, sessile. Inflorescences mostly of a single flower or sometimes umbelliform with 2 flowers, pedunculate, axillary; peduncles 0.3–1.5 mm long; bracts 3–7, persistent, narrowly ovate to ovate, 1.9–2.8 mm long, 0.6–1.5 mm wide, acute to obtuse at tip, glabrous, papillose. Male flowers sessile; calyx lobes 5, yellowish coloured, elliptic to oblong-elliptic, 3.4–4.5 mm long, 2–3 mm wide, rounded at tip, glabrous or sometimes with scattered simple hairs on margin; androecium 3.2–5.5 mm long, 0.6–0.8 mm across; stamens 40–50; filaments 0.1–0.2 mm long; anthers 0.8–1.1 mm long. Female flowers sessile; calyx 5-lobed, yellow-green; tube c. 0.5 mm long; lobes ± equal, erect, elliptic or oblong-elliptic, 3–5 mm long in flower, up to 9 mm long in fruit, 1.7–3.0 mm wide, rounded at tip, glabrous, with margins fimbriate; petals rudimentary, up to 0.5 mm long and 0.3 mm wide, ovate, glabrous; ovary ovoid, 1.3–1.8 mm long, 1.1–1.6 mm across, 3-locular, glabrous or with scattered stellate hairs distally; style with ± glabrous column 0.5–1.0 mm long and 3 spreading limbs; limbs red, 2.8–4.5 mm long, c. 0.5 mm wide, deeply 3– or 4-lobed; lobes 1.0–3.3 mm long, 0.2–0.3 mm wide. Capsule ovoid, 8.1–9 mm long, 4.5–5 mm across, glabrous or with scattered stellate hairs, usually 1-seeded; persistent calyx lobes usually longer than capsule. Seed obloid, 6.5–6.7 mm long, 3.6–3.7 mm wide, 3–3.1 mm across, brown; caruncle pyramidal, 2.4–2.5 mm across, 1.5–1.8 mm long, creamy-white. Fig. 4.

***Additional specimens*: Queensland.** BURNETT DISTRICT: Beeron Holding, 6 km W of "Toondahra" homestead, Sep 1989, *Forster* & *Bean* PIF5753 (BRI); *ditto,* Sep 1999, *Forster et al.* PIF24880 (BRI); 'Rocky Paddock', 47.7 km SW of Gayndah, Aug 1993, *Halford* Q1789 (BRI); *ditto*, Aug 1993, *Halford* Q1788 (BRI, MEL); Beeron Holding, 43 km S of Mundubbera, Aug 1996, *Halford* Q2906 (BRI); *ditto*, Aug 1996, *Halford* Q2905 (BRI).

***Distribution and habitat*:** *Bertya granitica* is confined to the south-east of Queensland, where it is restricted to the Mundubbera district (Map 12). It grows on shallow sandy soils on exposed granite outcrops in open eucalypt forest or woodland communities.

***Phenology*:** Flowers have been recorded in August and September, fruits in October.

***Affinities*:** *Bertya granitica* seems most closely related to *B. pinifolia* but differs from that in its shorter and proportionally broader leaf laminas (leaf lamina length/width ratio 25:1 compared with 30:1), its generally larger calyx lobes in female flowers (3.0–5.0 × 1.7–3.0 mm compared with 2.9–3.6 × 1.3–1.9 mm), its larger capsules (8.1–9.0 × 4.5–5.0 mm compared with 7.0–7.5 × 3.2–3.5 mm) and its larger seeds (6.5–6.7 × 3.6–3.7 × 3.0–3.1 mm compared with 4.7–5.2 × 2.7–2.8 × 2.3–2.4 mm).

B. granitica is also similar to *B. recurvata* and *B. gummifera* but differs from the former in having ciliate rather than glabrous margins on calyx lobes of female flowers and leaf laminas not recurved distally. *B. granitica* differs from *B. gummifera* in having an acute leaf apex terminated by an apiculate gland rather than a rounded leaf apex that lacks a terminal glandular apiculum.

***Etymology*:** The specific epithet 'granitica' refers to exposed granite rock outcrops upon which this species is found.

10. Bertya gummifera Planch., London J. Bot. 4: 473, t. 16, fig. 6 (1845); *Bertya gummifera* Planch. var. *gummifera*, Müll.Arg., Flora 47(30): 471 (1864). **Type:** [New South Wales.] barren rocky cliffs, W from Wellington Valley, near Croker's Range, [in 1825,] *A. Cunningham* 49 (holo: K (ex herb. Hook.)).

Bertya polymorpha forma *mitchelliana* Baill., Adansonia 6: 299 (1866). **Type:** [New South Wales.] barren rocky cliffs, W from Wellington Valley, near

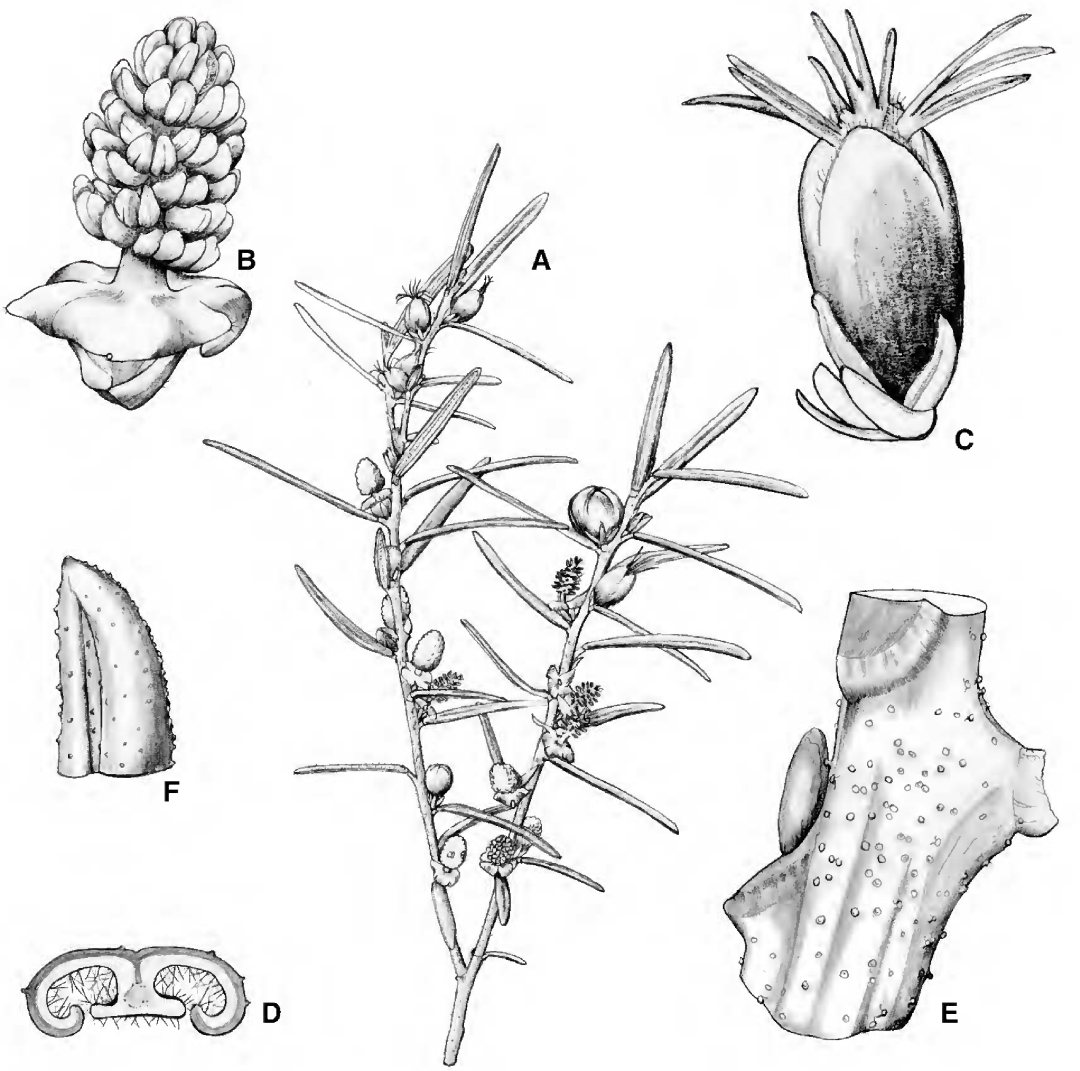

Fig. 4. ***Bertya granitica***. A. branchlet with flowers. ×1. B. male flower from side. ×6. C. female flower from side. ×6. D. transverse section of leaf. ×16. E. section of branchlet. ×24. F. oblique lateral view of leaf apex. ×16. A–C from *Forster et al.* PIF24880 (BRI); D, F from *Forster* & *Ryan* PIF19607 (BRI); E from *Forster* & *Bean* PIF5753 (BRI). Del. W. Smith.

Croker's Range, [in 1825,] *A. Cunningham* 49 (lecto, here chosen: K (ex herb. Hook.)).

Bertya neglecta Dümmer, J. Bot. 52: 151/152 (1914). **Type:** [New South Wales.] Barrens north of Arbuthnot's Range [Warrumbungle Ranges], [without date,] [*C.*] *Fraser* (holo: CGE *n.v.*, photo BRI).

Bertya gummifera var. *genuina* Müll.Arg., Flora 47(30): 471 (1864), *nom. inval.*

Monoecious (sometimes predominantly male or female), much branched shrubs to 2 m high, viscid on flower buds and flowers. Branchlets angular, becoming ± terete with age, with a moderately dense indumentum of stellate hairs, becoming glabrous with age though remaining coarsely tuberculate by persistent hair bases; hairs stipitate, white, up to 1.5 mm across, with stipes up to 0.4 mm long. Leaves petiolate, spirally alternate, ascending to spreading; petiole ± plano-convex, 1.4–1.9 mm long, with scattered stipitate stellate hairs up to 0.3 mm long; lamina linear, 10–30 mm long, 0.9–1.5 mm wide, recurved at tip; adaxial surface green, with moderately dense indumentum of stipitate stellate hairs, glabrescent, coarsely tuberculate with persistent hairs bases; abaxial surface white, densely hairy with stellate 0.3–0.6 mm across and simple glandular hairs up to 0.05 mm long; margin recurved or revolute to midrib concealing lower leaf lamina surface; apex rounded; base cuneate; midvein impressed adaxially, abaxially raised, angular, with scattered stipitate stellate hairs on abaxial face, stellate-pubescent laterally; marginal glands present at base of lamina, 1 each side of midrib, 0.2–0.3 mm across, sessile. Inflorescences of a single flower or umbelliform with 2 flowers, pedunculate, axillary; peduncles 1–1.5 mm long; bracts 5–8, persistent, narrowly ovate to narrowly ovate, 1.9–4 mm long, 0.9–1.9 mm wide, obtuse or acute at tip, sparsely stellate-pubescent or glabrous abaxially, glabrous adaxially. Male flowers pedicellate with pedicels up to 0.8 mm long, glabrous; calyx lobes 5, yellow-green with reddish blush on margin, elliptic to oblong-elliptic, 4.5–5.8 mm long, 3–4.3 mm wide, rounded at tip, glabrous except for scattered minute simple hairs on margin; androecium 5.5–6.5 mm long, 0.6–0.9 mm across; stamens 46–61; filaments 0.1–0.2 mm long; anthers 1–1.5 mm long. Female flowers sessile; calyx 5(rarely 6)-lobed, light green at anthesis, becoming dark red with age; tube up to 0.5 mm long; lobes equal, erect, elliptic or ovate, 3.8–6.2 mm long in flower, up to 10 mm long in fruit, 2.2–3.5 mm wide, rounded at tip, glabrous, with margins fimbriate; petals rudimentary, ovate, up to 0.6 mm long and 0.2 mm wide, glabrous; ovary subglobose or ovoid, 1.4–2.0 mm long, 1.4–1.6 mm across, 3-locular, glabrous; style with glabrous column 1.5–2.0 mm long and 3 spreading limbs; limbs pink to red, 4.9–8.2 mm long, 0.4–1.0 mm wide, deeply 3- or 4-lobed; lobes 3.8–6.2 mm long, 0.2–0.3 mm wide. Capsule ellipsoid, 6.9–9.2 mm long, 3–4.1 mm across, glabrous, usually 1-seeded; persistent calyx lobes > half the capsule length. Seed obloid, 5.3–7 mm long, 3.2–3.5 mm wide, 2.7–3 mm across, dark brown; caruncle pyramidal, 1.7–2.0 mm across, 0.8–1.0 mm long, creamy-white.

***Selected specimens (from 48 examined)*: New South Wales.** Dubbo-Mendooran road, Dec 1944, *Althofer* (NSW); Cobbora, May 1946, *Althofer* 86 (NSW); 3 miles [c. 5 km] ESE of Dewar, Goonoo State Forest, Aug 1955, *Biddiscombe* 341 (CANB); Rocky Glen, c. NE of Coonabarabran, Sep 1908, *Boorman* (NSW); Mt Dangar, Gungal, near Merriwa, Sep 1904, *Boorman* (AD, NSW); Denman, Jul 1907, *Cambage* (NSW); 3 miles [c. 5 km] NW of Sandy Hollow, Aug 1962, *Constable* 4023 (BRI, CANB, K, MEL, NSW); Cox's Gap, 6.9 km NNE of the Sandy Hollow-Muswellbrook Road via Wybong, Sep 1974, *Coveny & Jacobs* 5626 (K, NSW); 8 miles [c. 13 km] NW of Denman on road to Sandy Hollow, Oct 1970, *Fisher* 260 (BRI, CANB, NSW); c. 38 km SW of Dubbo on Newell Highway to Peak Hill in Momo State Forest, Sep 1989, *Henderson & Turpin* H3244 (BRI, NSW); *ditto*, Sep 1989, *Henderson & Turpin* H3245 (BRI, DNA, MEL, NSW); N side of Belougery Split Rock, Warrumbungle Mountains, Oct 1966, *Johnson & Briggs* 945 (NSW); 7 miles [c. 11 km] from Cobbora on Boomley road, Aug 1950, *Johnson & Constable* (K, NSW); Burbie Creek, Warrumbungle Range, 29 km W of Coonabarabran, Dec 1973, *Streimann* HS591 (BRI, CANB); Burbire Canyon, Warrambungles National Park, Aug 1984, *Walsh* 1318 (MEL, NSW); Pilliga Nature Reserve, 1 km from the Newell Highway on road to Yamimba Picnic area, Aug 1984, *Wiecek & Wannan* UNSW16477 (NSW); unnamed peak, 25-30 km N of Rylstone, Jul 1983, *Williams* 11 (NSW); 19 miles [c. 30 km] W of Coonabarabran, Oct 1971, *Williams* (NE).

***Distribution and habitat*:** *Bertya gummifera* occurs in central New South Wales in an area more or less bounded by Narrabri, Moonbi, Mt Dangar, Kandos, Dubbo and the Warrumbungle Ranges (Map 13). It is recorded from dry sclerophyll forest, low open woodland,

open mallee, shrubland or heathland communities on shallow sandy soils on rocky hillsides and ridges of sandstone, granite or trachyte. It is also recorded along rocky sandstone watercourses.

***Phenology*:** Flowers have been recorded from May to December, fruits from October to December.

***Affinities*:** *Bertya gummifera* seems most closely allied to *B. pinifolia, B. recurvata* and *B. granitica*. It differs from *B. pinifolia* in having proportionally shorter leaf laminas (leaf lamina length/width ratio less than 20:1 compared with greater than 30:1) and a rounded leaf apex that lacks a terminal apiculum compared with an acute leaf apex terminated by an apiculate gland. For features distinguishing *B. gummifera* from *B. recurvata* and *B. granitica* see notes under those species.

***Notes*:** Hunter's collection 2575 in BRI from Moore Creek Gap near Moonbi in New South Wales is presently included in, but is atypical of *B. gummifera* in that it is not as hairy on the branchlets and leaves and the leaves are generally smaller than those in the typical form of this species. Study of further collections is required to assess the significance of this variation.

11. Bertya ingramii T.A.James, Telopea 3(2): 285-286 (1988). **Type:** New South Wales. top of Dangar's Falls, SE of Armidale, Jan 1964, *J.B. Williams* K29 (holo: NSW; iso NE, *n.v.*, *fide* James *loc. cit.*).

Monoecious or apparently dioecious, much branched shrubs to 2.5 m high. Branchlets angular, becoming ± terete with age, with a dense indumentum of stellate hairs, becoming glabrous with age though remaining minutely tuberculate by persistent hair bases; hairs sessile or stipitate, white to grey-white, 0.1–0.2 mm across; stipes up to 0.2 mm long. Leaves petiolate, spirally alternate, spreading; petiole ± bi-convex, 2.1–3.2 mm long, with a dense stellate-pubescent indumentum up to 0.2 mm thick; lamina linear to lorate, linear-obovate or narrowly ovate, 22–37 mm long, 1.9–5 mm wide; adaxial surface dark green to grey-green, sparsely hairy with stipitate stellate hairs up to 0.1 mm across, glabrescent, minutely tuberculate with persistent hair bases; abaxial surface white, densely hairy with sessile and stipitate stellate hairs 0.1–0.2 mm across; margin recurved to revolute; apex obtuse to acute, rarely minutely apiculate; base cuneate to attenuate; midvein obscure, raised or rarely slightly impressed adaxially distally, abaxially raised, angular, stellate-pubescent on all surfaces; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.15 mm across, sessile. Inflorescences of a single flower or rarely umbelliform with 2 flowers, pedunculate, axillary; peduncles 0.9–1.5 mm long; bracts 6–10, persistent; outer bracts narrowly triangular or narrowly ovate, 1.6–3.8 mm long, 0.7–1.7 mm wide, acute at tip, stellate-pubescent on both surfaces; inner bracts ovate to broadly ovate, 1.4–1.8 mm long, 1.0–1.2 mm wide, obtuse at tip, glabrous. Male flowers sessile; calyx lobes 5, light green sometimes with a reddish blush distally, narrowly elliptic to elliptic or oblong-elliptic, 4.0–4.8 mm long, 2.5–3.2 mm wide, rounded at tip, glabrous or sometimes with scattered stellate hairs on margin; androecium 3.5–4.2 mm long, 0.6–0.7 mm across; stamens 34–46; filaments c. 0.1 mm long; anthers 0.9–1.4 mm long. Female flowers sessile; calyx 5-lobed, light green coloured; tube c. 0.5 mm long; lobes equal, erect to spreading, recurved distally, ovate to broadly ovate, 1.5–2.2 mm long, 1.1–1.6 mm wide, obtuse at tip, glabrous, with margins fimbriate; petals rudimentary, ovate or oblong, up to 0.4 mm long and 0.3 mm wide, glabrous; ovary subglobose, c. 1.6 mm long, c. 1.5 mm across, 3-locular, densely stellate-tomentose; style with hairy column 0.2–0.4 mm long and 3 spreading limbs; limbs red, 1.5–1.9 mm long, 0.4–0.5 mm wide, deeply 2– or 3-lobed; lobes 0.8–1.3 mm long, 0.3–0.5 mm wide. Capsule narrowly ovoid to ovoid, 7.5–10 mm long, 3.2–3.5 mm across, sparsely stellate-pubescent with long and short hairs, glabrescent, 1(sometimes 2)-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid or ellipsoid, 5.0–5.6 mm long, 2.9–3.3 mm wide, 2.8–3.0 mm across, light brown to brown; caruncle pyramidal, 2.0–2.1 mm across, 1.0–1.7 mm long, yellowish-white coloured.

***Selected specimens (from 12 examined)*: New South Wales.** near Mihi Falls, Oxley Wild Rivers National Park,

Sep 1997, *Copeland* 97-952 (NSW); top of Dangar's Falls, c. 300 m from carpark, Oxley Wild Rivers National Park, Dec 1996, *Davies & Johnstone* 49 (NSW); Dangar's Falls, c. 20 km S of Armidale, Sep 1976, *Hassall* 7667 (BRI); Dangar's Falls, c. 21 km S of Armidale, Oxley Wild Rivers National Park, Sep 1990, *Henderson & Turpin* H3405 (BRI); *ditto*, Sep 1990, *Henderson & Turpin* H3404 (BRI); Gara River, via Armidale, Oct 1936, *Ingram* (NSW); Dangar's Falls, Armidale, Sep 1971, *McBarron* 20294 (NSW); top of Dangar's Falls, near Armidale, Oct 1959, *Williams* G60 (NSW); *ditto*, Jan 1964 *Williams* K29 (NSW); *ditto*, Aug 1966, *Williams* (BRI, NE); Mihi Falls, c. 20 km E of Armidale, Aug 1989, *Williams* (BRI).

***Distribution and habitat*:** *Bertya ingramii* is confined to the Oxley Wild Rivers National Park near Armidale, in northern New South Wales (Map 14). It is recorded from dense heathland and shrubland communities on shallow loamy soils at cliff edges and in crevices on cliff-faces.

***Phenology*:** Flowers have been recorded from August to October, fruits in January.

***Affinities*:** *Bertya ingramii* resembles *B. polystigma* but can be distinguished from that by its finer indumentum on branchlets, its minutely tuberculate upper leaf lamina surface and its ovate to broadly ovate calyx lobes in female flowers. It also resembles *B. grampiana*. For distinguishing characters refer to notes under *B. grampiana.*

12. Bertya lapicola Halford & R.J.F.Hend. **sp. nov.** arte affinis *B. pedicellatae* F.Muell. ut videtur sed statura breviore (ad 2 m non ad 6 m alta), ramulis glabris non sparse stellato-pubescentibus, et foliis petiolis brevioribus (0.9–1.2 mm non 1.5–5.2 mm longis) et laminis omnino linearibus non lineari-obovatis vel lineari-ellipticis maximam partem differt. **Typus:** Queensland. MORETON DISTRICT: 4 km along Goldmine Road, 12 km N of Helidon, 12 April 1992, *L.H. Bird & D. Schreiber* (holo: BRI [AQ542245]; iso: K, NSW).

Monoecious, much branched shrubs up to 2 m high, thinly viscid on most parts. Branchlets angular, becoming terete with age, glabrous. Leaves petiolate, spirally alternate, ascending to spreading; petiole plano-convex, 0.9–1.2 mm long, glabrous, smooth; lamina linear, 15–55 mm long, 1.3–1.9 mm wide; adaxial surface green, glabrous, ± smooth, sometimes punctate in dried state; abaxial surface white, densely hairy with sessile stellate hairs 0.4–0.9 mm across; margin recurved to midrib usually concealing abaxial lamina surface; apex acute, ultimately apiculate with extension from midrib up to 0.2 mm long and terminated by a small brownish coloured gland; base obtuse; midvein impressed adaxially, abaxially raised, angular, glabrous and smooth on abaxial face, stellate-pubescent laterally; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.2 mm across, sessile or stipitate with stipes up to 0.2 mm long. Inflorescences of a single flower, pedunculate, axillary or terminal on a rudimentary, short branchlet in distal leaf axils; peduncles 1–6 mm long; bracts 2–5, persistent, linear-ovate or lorate, 0.8–2.6(–7) mm long, 0.4–0.5(–1) mm wide, acute at tip, glabrous. Male flowers sessile or pedicellate with pedicels up to 2 mm long, glabrous; calyx lobes 5, light green, elliptic or oblong-elliptic, 4–5.1 mm long, 2.1–3.5 mm wide, rounded at tip, glabrous; androecium 2.8–6 mm long, 0.7–0.8 mm across; stamens 55–77; filaments c. 0.1 mm long; anthers 0.8–1.2 mm long. Female flowers pedicellate; pedicels 2.8–4.0 mm long, glabrous; calyx 5-lobed, light green; tube c. 0.1 mm long; lobes equal, erect, recurved to revolute distally, linear-ovate or linear-oblong, 1.8–5.5 mm long, 0.6–1.1 mm wide, acute at tip, glabrous, with margins entire; petals absent; ovary narrowly ellipsoid, 1.8–2.5 mm long, 0.9–1.5 mm across, 3(rarely 5)-locular, glabrous, verrucose; style with glabrous column 0.8–1.3 mm long and 3 ascending limbs; limbs red, 3.5–6 mm long, 0.3–0.4 mm wide, deeply 2– or 3-lobed; lobes 1.5–4.1 mm long, 0.1–0.2 mm wide. Capsule narrowly ovoid or pyriform, 8.5–12 mm long, 4–5.5 mm across, glabrous, usually 1-seeded; persistent calyx lobes ≤ to half the capsule length. Seed obloid-ellipsoid or ellipsoid, 5.4-6.9 mm long, 2.9–3.7 mm wide, 2.8–3.5 mm across, light brown to dark brown; caruncle pyramidal, 1.4–2.0 mm across, 1.0–1.8 mm long, creamy-white.

***Affinities*:** *Bertya lapicola* seems closely related to *B. pedicellata* but can be distinguished from that by its smaller habit (up to 2 m compared with up to 6 m tall), glabrous rather than sparsely stellate-pubescent

branchlets, shorter petioles (0.9–1.2 mm long compared with 1.5–5.2 mm long) and linear rather than mostly linear-obovate or linear-elliptic leaf laminas.

***Etymology*:** The specific epithet is derived from Latin, *lapis* (stone) and *-cola* (-dweller), and refers to the rocky sandstone sites where this species occurs.

***Notes*:** This species is confined to the south-east of Queensland where it has disjunct populations within its overall distribution. Two subspecies are therefore recognized here.

Shrubs to 2 m high; leaf laminas (2.5)3.5–5.5 cm long; basi-laminar glands with stipes up to 0.2 mm long; peduncles of male flowers slender, 4–6 mm long. ..... **12a. B. lapicola** subsp. **lapicola**

Shrubs to 1.5(rarely 2) m high; leaf laminas 1.5–3.0(4.0) cm long; basi-laminar glands sessile; peduncles of male flowers stout, 1–4 mm long. ..... **12b. lapicola** subsp. **brevifolia**

12a. Bertya lapicola Halford & R.J.F.Hend. subsp. **lapicola**

Bertya sp. (Helidon Hills G.Leiper AQ457013), Forster & Halford (2002, p. 69).

For differences between subspecies see key above. Fig. 5.

***Additional specimens*:** **Queensland.** Moreton District: Alice Creek, 7.5 km ESE of Murphys Creek rail siding, Aug 1990, *Forster & Bird* PIF7102 (BRI); Portion 43V, Parish of Helidon, Aug 1989, *Grimshaw* GS49 (BRI); White Mountain State Forest 564, 5 km NE of Murphys Creek township, Sep 1993, *Halford* Q1877 (BRI); Helidon Hills, c. 10 km NNW of Helidon township, Sep 1989, *Henderson & Guymer* H3234 (BRI); western end of David's road, on portion 43V, Helidon, Aug 1989, *Leiper* (BRI); Helidon Hills, high cliffs N of Paradise Creek, Sep 1993, *Sparshott & Sparshott* 110 (BRI).

***Distribution and habitat*:** *Bertya lapicola* subsp. *lapicola* is confined to the sandstone hills north of Helidon in south-east Queensland (Map 15). It is recorded from sandy soils on steep hill slopes or along cliff lines in open forest communities dominated by *Eucalyptus fibrosa* subsp. *nubila* (Maiden & Blakely) L.A.S.Johnson, *E. acmenoides* Schauer, *Corymbia henryi* (S.T.Blake) K.D.Hill & L.A.S.Johnson, *E. baileyana* F.Muell. and *Lysicarpus angustifolius* (Hook.) Druce.

***Phenology*:** Flowers have been collected from June to September, with one collection in April, fruits from April, August to October and December.

12b. Bertya lapicola subsp. **brevifolia** Halford & R.J.F.Hend. **subsp. nov.** ab *B. lapicola* Halford & R.J.F.Hend. subsp. *lapicola* foliis plerumque brevioribus (1.5–3.0(4.0) cm non (2.5)3.5–5 cm longis), glandibus ad basin laminarum sessilibus non stipitibus usque ad 0.2 mm longis et floribus masculinis pedunculis 1–4 mm longis et crassis non 4–6 mm longis et gracilibus differt. **Typus:** Queensland. Leichhardt District: Salvator Rosa National Park, 170 km SW of Springsure, September 1987, *M.B. Thomas* 240 (holo: BRI).

Bertya sp. (Oakey Creek B.O'Keeffe 822), Forster & Halford (2002, p. 69).

For differences between subspecies see key above.

***Selected specimens (from 21 examined)*:** **Queensland.** Leichhardt District: Pythagoras Mt, Salvator Rosa National Park, Oct 1981, *Ballingall & Cockburn* MEB426 (BRI); *ditto*, in 1984 *Ballingall* MEB1178 (BRI); just E of Planet Creek, Planet Downs, E of Rolleston, Oct 1998, *Bean* 14220 (BRI); Nathan Gorge, Oct 1989, *Bean* 1133 (BRI); Robinson Gorge National Park, Sep 1992, *Forster & Sharpe* PIF11360 (BRI, NSW); SW base of Shepherds Peak, Robinson Creek, Expedition National Park, Sep 1995, *Forster & Figg* PIF17762 (BRI); Nathan Gorge, SW of Cracow, Aug 1990, *Forster* PIF7165 (BRI); 2 miles [c. 3 km] N of Mt Playfair, Aug 1966, *Gittins* 1170 (NSW); Oakey Creek, Expedition Gully, Oct 1984, *O'Keeffe* 813 (BRI); *ditto*, Oct 1984, *O'Keeffe* 822 (BRI); *ditto*, Sep 1990, *O'Keeffe* 966 (BRI).

***Distribution and habitat*:** *Bertya lapicola* subsp. *brevifolia* is geographically disjunct

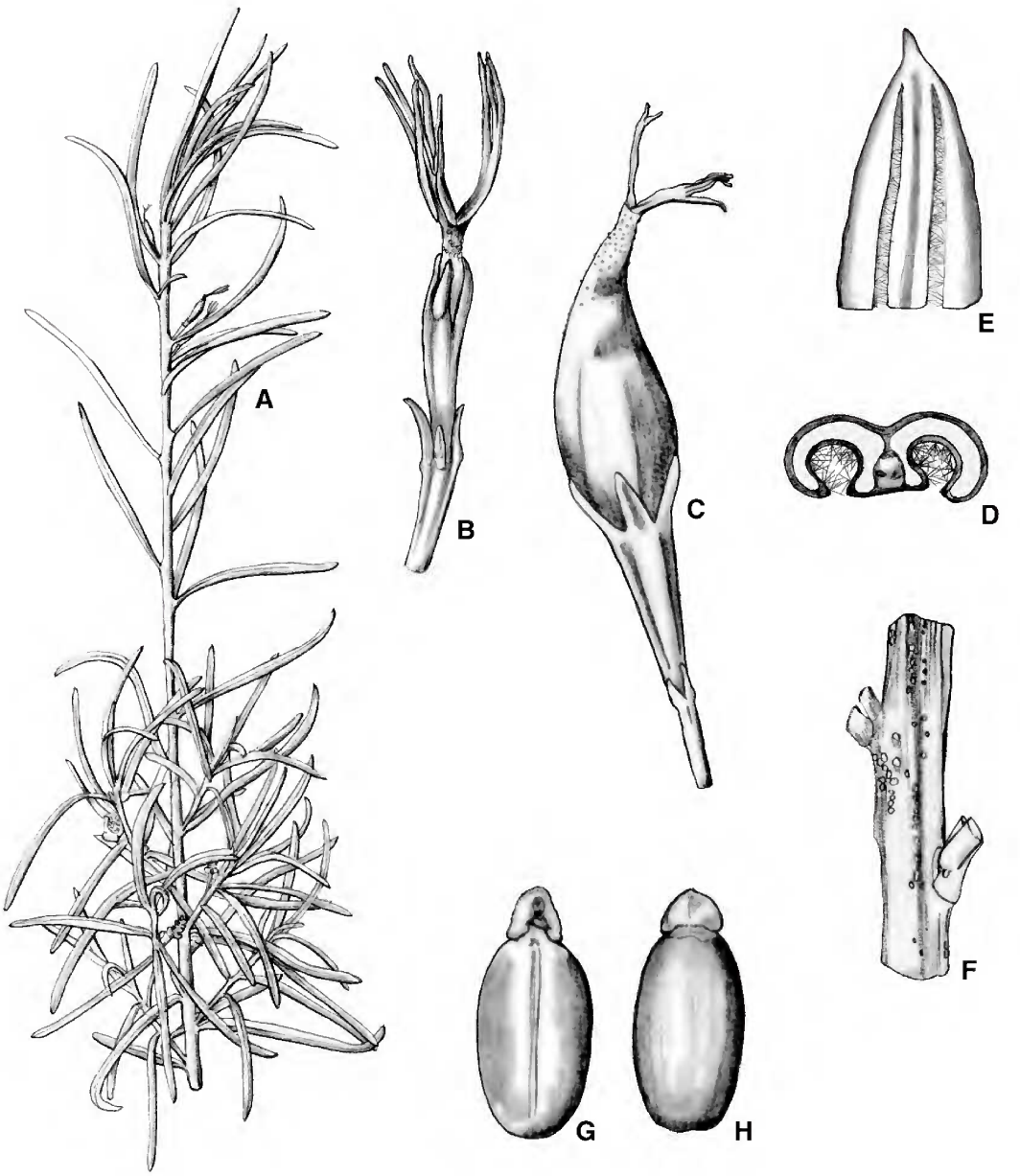

Fig. 5. ***Bertya lapicola*** subsp. ***lapicola***. A. branchlet with flowers. ×0.8. B. female flower from side. ×4. C. fruit from side. ×4. D. transverse section of leaf. ×16. E. abaxial view of leaf apex. ×16. F. section of branchlet. ×4. G. ventral view of seed. ×4. H. dorsal view of seed. ×4. A, C–H from *Henderson* & *Guymer* H3234 (BRI); B from *Forster* PIF7102 & *Bird* (BRI). Del. W. Smith.

from *B. lapicola* subsp. *lapicola* (Map 16). *B. lapicola* subsp. *brevifolia* is confined to the Carnarvon and Expedition Ranges, in the Springsure - Injune area of central Queensland. It grows in open eucalypt forest or open *Eucalyptus/Callitris* woodland communities associated with sandstone outcrops. The soils are generally recorded as shallow and sandy.

***Affinities*:** This subspecies differs from the other subspecies by its generally shorter leaves and stouter and shorter pedicels of the male flowers.

***Etymology*:** The subspecific epithet is from Latin *brevis* (short) and *-folius* (-leaved), and refers to the comparatively shorter leaves which characterize this subspecies.

13. Bertya linearifolia Halford & R.J.F.Hend. **sp. nov.** arte affinis *B. lapicola* Halford & R.J.F.Hend. ut videtur sed ramulis stellato-pubescentibus non glabris, foliis laminis 12–18 mm non 15–55 mm longis, et bracteis in inflorescentiis caducis non persistentibus differt. Nonnulla specimina *B. linearifoliae* pro *B. cunninghamii* Planch. determinata sed *B. linearifolia* differt ab *B. cunninghamii* floribus femineis pedicellis longioribus (2.5–5.0 mm non 0.3–1.0 mm longis), capsulis grandioribus (9–11 × 3.2–3.5 mm non 4.8–7.2 × 2.9–4.2 mm), et foliis ad apicem acutis et apiculo non rotundis, obtusis vel truncatis. **Typus:** New South Wales. Upper Baerami Valley, 30 km from Sandy Hollow, 17 July 1988, *C. Gibson & R. Miller* [NSW216894] (holo: NSW).

Monoecious, much branched shrubs, viscid on young shoots and branchlets. Branchlets angular, becoming terete with age, with a sparse indumentum of stellate hairs, glabrescent, sparsely tuberculate; hairs stipitate, white, 0.3–0.4 mm across, with stipes up to 0.1 mm long. Leaves petiolate, spirally alternate, ascending to spreading; petiole plano-convex, 1.0–1.5 mm long, glabrous, smooth; lamina linear, 12–18 mm long, 1.0–1.3 mm wide; adaxial surface green, glabrous, ± smooth; abaxial surface white, sparsely to densely hairy with sessile stellate hairs c. 0.1 mm across; margin recurved to midrib concealing abaxial surface; apex acute, ultimately apiculate by extension of midrib to 0.2 mm long terminated by a small brownish coloured gland; base cuneate; midvein obscured or slightly impressed adaxially, abaxially raised, angular, glabrous and smooth on abaxial face, stellate-pubescent laterally; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.3 mm across, sessile or stipitate with stipes up to 0.1 mm long. Inflorescences of a single flower, pedunculate, axillary or sometimes terminal on a rudimentary, short branchlet in distal leaf axils; peduncles 2–3 mm long; bracts 2–5, persistent or caducous, lorate, 1.0–1.8 mm long, 0.3–0.4 mm wide, rounded at tip, glabrous. Male flowers sessile or pedicellate with pedicels up to 1 mm long, glabrous; calyx lobes 5, of unknown colour when fresh, oblong-elliptic, 3.5–4.0 mm long, 2.0–2.3 mm wide, rounded at tip, glabrous; androecium 2.7–3.2 mm long, 0.4–0.5 mm across; stamens 25–35; filaments c. 0.1 mm long; anthers c. 0.6 mm long. Female flowers pedicellate; pedicels 2.5–5.0 mm long, glabrous; calyx 5-lobed, of unknown colour when fresh; tube c. 0.1 mm long; lobes equal, erect, linear-ovate or linear-oblong, c. 2.5 mm long, c. 1.0 mm wide, obtuse at tip, glabrous, with margins entire; petals absent; ovary narrowly ellipsoid, c. 2 mm long, c. 1 mm across, 3-locular, glabrous, smooth; style with glabrous column c. 1 mm long and 3 ascending limbs; limbs of unknown colour when fresh, 3.0–3.5 mm long, c. 0.3 mm wide, entire or deeply 2– or 3-lobed; lobes 1.5–3.5 mm long, 0.1–0.2 mm wide. Capsule narrowly ovoid or pyriform, 8.5–10 mm long, 3.2–5.2 mm across, glabrous, usually 1-seeded; persistent calyx ≤ half the capsule length. Seed not seen. Fig. 6 & 7.

***Additional specimen*:** **New South Wales.** Denman, Jul 1924, *Laseron* [NSW194999](NSW).

***Distribution and habitat*:** *Bertya linearifolia* is restricted the Denman - Sandy Hollow area in the Central Western Slopes of New South Wales (Map 17). It is recorded as growing on a ridge in association with *Eucalyptus* species, *Prostanthera cryptandroides* A.Cunn. ex Benth. and *Hemigenia cuneifolia* Benth.

***Phenology*:** Flowers and fruits have been recorded in July.

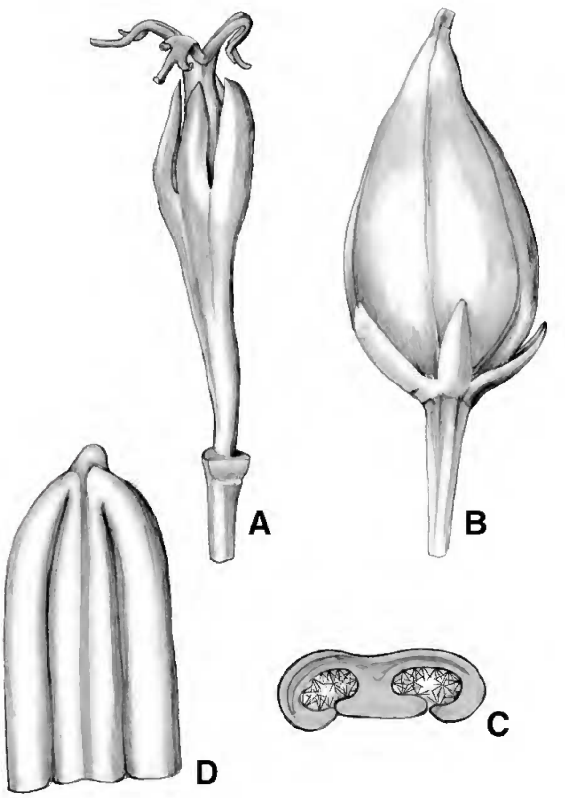

Fig. 6. ***Bertya linearifolia.*** A. female flower from side. ×6 . B. fruit from side. ×4. C. transverse section of leaf. ×16. D. abaxial view of leaf apex. ×16. A–D from *Gibson & Millar* [NSW216894] (NSW). Del. W. Smith.

***Affinities*:** *Bertya linearifolia* seems most closely related to *B. lapicola* from which it can be distinguished by having stellate-pubescent rather than glabrous branchlets, shorter leaf laminas (12–18 mm compared with 15–55 mm long) and caducous rather than persistent bracts.

Specimens of *B. linearifolia* have previously been identified as *B. cunninghamii* but can be distinguished from that by the longer pedicels on female flowers (2.5–5.0 mm long compared with 0.3–1.0 mm long), larger capsules (9–11 × 3.2–3.5 mm compared with 4.8–7.2 × 2.9–4.2 mm) and by the prominent apiculum at the leaf tips.

***Etymology*:** The specific epithet is derived from Latin *linearis* (linear) and *-folius* (-leaved), and refers to the linear leaves of the species.

14. Bertya mollissima Blakely, Contr. New South Wales Natl Herb. 1: 120 (1941). **Type:** [New South Wales.] Warrumbungle Ranges, October 1899, *W. Forsyth* (holo: NSW, photo BRI).

Monoecious (sometimes predominantly male or predominantly female), much branched shrubs up to 3 m high. Branchlets ± terete, with a moderately dense to dense indumentum of stellate hairs, becoming glabrous with age, though remaining tuberculate by persistent hair bases; hairs sessile or stipitate, straw-coloured to golden-yellow, 0.4–0.6 mm across; stipes up to 0.2 mm long. Leaves petiolate, spirally alternate, spreading; petiole ± plano-convex, 0.8–2.2 mm long, glabrous adaxially, with a moderately dense stellate-pubescent indumentum up to 0.2 mm thick abaxially; lamina linear to lorate, oblong or rarely narrowly elliptic, 6–24 mm long, 1.4–3.7 mm

Fig. 7. Type of ***Bertya linearifiolia*.**

wide; adaxial surface green, densely hairy with stipitate stellate hairs, 0.3–0.4 mm across, glabrescent, tuberculate with persistent hair bases; abaxial surface white, densely hairy with sessile and shortly stipitate stellate hairs 0.4–0.5 mm across; margin recurved; apex obtuse to rounded; base obtuse to cuneate; midvein impressed adaxially, abaxially raised and angular, stellate-pubescent with straw-coloured hairs on abaxial face and white hairs laterally; marginal glands absent or occasionally present at base of lamina when 1 each side of midrib, c. 0.1 mm across, stipitate with stipes 0.1–0.2 mm long. Inflorescences of a single flower, pedunculate, axillary; peduncles 1–1.6 mm long; bracts 5–7, persistent; ovate or linear-ovate, 1.5–3.2 mm long, 0.5–1.7 mm wide, acute at tip, stellate-pubescent abaxially, glabrous or stellate-pubescent distally adaxially. Male flowers sessile; calyx lobes 5, yellowish to brown, ovate, 3.1–4 mm long, 2.3–3.2 mm wide, obtuse to rounded at tip, stellate-pubescent abaxially; androecium 3.0–3.7 mm long, 0.5–0.8 mm across; stamens 36–63; filaments c. 0.1 mm long; anthers 0.7–0.8 mm long. Female flowers sessile; calyx 5-lobed, light green to grey-white; tube c. 0.5 mm long; lobes equal, erect, narrowly ovate to ovate, 2.0–2.7 mm long, 0.8–1.4 mm wide, acute at tip, densely stellate-pubescent abaxially, glabrous adaxially, with margins entire; petals absent; ovary ovoid, 1.6–2.0 mm long, 1.5–1.6 mm across, 3-locular, densely stellate-pubescent; style with hairy column 0.1–0.2 mm long and 3 spreading limbs; limbs red, 1.5–2.3 mm long, c. 0.4 mm wide, deeply 2– to 4-lobed; lobes 0.8–1.7 mm long, 0.1–0.2 mm wide. Capsule narrowly ellipsoid or narrowly ovoid, 5.5–7.6 mm long, 2.6–3.6 mm across, glabrous except for a sparse to moderately dense indumentum of stellate hairs distally, usually 1-seeded; persistent calyx lobes c. ¼ the capsule length. Seed ovoid, c. 5.2 mm long, c. 2.5 mm wide, c. 2.1 mm across, light brown; caruncle pyramidal, c. 1.1 mm across, c. 0.8 mm long, yellowish-white.

***Selected specimens (from 20 examined)*: New South Wales.** Mt Kaputar, Mt Kaputar National Park, Nov 1976, *Coveny* & *Roy* 8872 (NSW); Mt Kaputar National Park at West Kaputar Lookout, Aug 1987, *Coveny et al.* 12723 (BRI, MEL, NSW); 0.4 km NE of Burrumbuckle Rock, Warrumbungle Range, Oct 1978, *Crisp* 4404 (CANB); Mt Kaputar National Park, West Kaputar Rock, Nov 1993, *Forster* & *Machin* PIF14190 (BRI, NSW); Warrumbungle Ranges, Oct 1899, *Forsyth* (NSW); summit area of Mt Kaputar, Mt Kaputar National Park, Nov 1987, *Fox* 87/091 (CANB); Mt Kaputar, Sep 1976, *Hassall* 7670 (BRI); summit of Mt Kaputar, Mt Kaputar National Park, Oct 1990, *Henderson* & *Turpin* H3485 (BRI); *ditto*, Oct 1990, *Henderson* & *Turpin* H3487 (BRI); West Kaputar Rock Lookout, Mt Kaputar National Park, Oct 1990, *Henderson* & *Turpin* H3483 (BRI); *ditto*, Oct 1990, *Henderson* & *Turpin* H3484 (BRI); Mt Kaputar, Sep 1949, *Ingram* (NSW); peak of Mt Kaputar, Mt Kaputar National Park, Nov 1992, *Kennedy et al.* 469 (NSW); "Belmont", 42 miles [c. 67 km] E from Scone, Jun 1939, *Rupp* (BRI, NSW); near Mt Wombelong, Warrumbungle Range, Dec 1973, *Streimann* H5557 (CANB, NSW).

***Distribution and habitat*:** *Bertya mollissima* is confined to central New South Wales from Mt Kaputar, Warrumbungle and Liverpool Ranges to the Scone and Singleton districts (Map 18). It is recorded from rocky sites on steep hillsides and on mountain summits in open heath or open eucalypt woodland communities. Soils are shallow grey sandy or gravelly loams overlying basalt, trachyte or andesite.

***Phenology*:** Flowers have been recorded from September to December, with one record in June, fruits in December.

***Notes*:** Collections from Mt Kaputar (e.g. *Coveny et al.* 12723 (BRI, MEL, NSW), *Henderson* & *Turpin* H3485 (BRI)) have narrower leaves than do collections from other populations of the species. These may represent a distinct variety but study of further material from throughout the species' range would be needed to confirm this.

15. Bertya oblonga Blakely, Proc. Linn. Soc. New South Wales 54: 682, pl. 29 (1929). **Type:** [New South Wales.] Pinecliffe, 7 November 1907, *W.F. Blakely* (holo: NSW [NSW194889]; iso: MEL [MEL114086], K).

Bertya species D, James & Harden (1990, p. 416).

Monoecious or dioecious, intricately branched shrubs to 1.8 m high, viscid on adaxial leaf surfaces and flower buds. Branchlets ± terete, with a dense indumentum of stellate hairs; hairs sessile, pale straw-coloured or grey-white, up to 0.1 mm across. Leaves petiolate, spirally alternate, ascending to spreading; petiole plano-convex, 1.3–2.2 mm long, with a dense

stellate-pubescent indumentum up to 0.1 mm thick; lamina narrowly oblong to lorate or sometimes linear, 8–23 mm long, 1.3–3 mm wide; adaxial surface green, glabrous; abaxial surface white, densely hairy with ± sessile stellate hairs 0.1–0.2 mm across; margin flat to recurved or rarely revolute; apex rounded or obtuse; base obtuse; midvein impressed adaxially, abaxially slightly raised, rounded or slightly angular, with moderately dense indumentum of stellate hairs; marginal glands usually present at base of lamina, 1 each side of midrib, 0.1–0.15 mm across, sessile or stipitate with stipes up to 0.2 mm long. Inflorescences of a single, flower, pedunculate, axillary; peduncles 1.5–2.5 mm long; bracts 2–8, caducous or persistent; outer bracts narrowly triangular, narrowly ovate or oblong, 0.8–2.1 mm long, 0.6–1 mm wide, acute or obtuse at tip, stellate-pubescent abaxially, glabrous adaxially; inner bracts narrowly ovate, 1.3–1.6 mm long, 0.4–0.5 mm wide, acute at tip, glabrous or sparsely stellate-pubescent abaxially. Male flowers sessile or pedicellate with pedicels 0.4–1 mm long, stellate-pubescent; calyx lobes 5, yellow-green with a reddish blush distally, ovate or oblong-elliptic, 3.1–4.1 mm long, 1.7–2.7 mm wide, rounded at tip, glabrous; androecium 3.5–5.5 mm long, 0.4–0.6 mm across; stamens 31–43; filaments 0.1–0.5 mm long; anthers 1.0–1.4 mm long. Female flowers pedicellate; pedicels 0.4–1.2 mm long, densely stellate-pubescent; calyx 5-lobed, light green coloured; tube 0.3–0.5 mm long; lobes ± equal, erect, narrowly triangular, 1.5–2.0 mm long, 0.5–1.0 mm wide, acute at tip, sparsely to densely stellate-pubescent abaxially, glabrous adaxially, with margins entire; petals absent; ovary ellipsoid, 1.8–2.0 mm long, 1.7–1.8 mm across, 3-locular, densely stellate-pubescent; style with hairy column 0.1–0.3 mm long and 3 spreading limbs; limbs red, 1.5–3.1 mm long, 0.3–0.8 mm wide, deeply 3-lobed; lobes 0.7–2 mm long, 0.1–0.2 mm wide. Capsule ovoid-ellipsoid, 7.5–9 mm long, 3.9–4.8 mm across, with a sparse to moderately dense indumentum of stellate hairs, usually 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid, 4.5–6.0 mm long, 2.9–3.2 mm wide, 2.4–2.8 mm across, dark brown or reddish brown; caruncle pyramidal, 1.5–1.8 mm across, 0.8–1 mm long, yellowish-white.

***Selected specimens (from 27 examined)*: New South Wales.** The Gap, Cumnock, *Althofer* (NSW); Eurimbula Gap, near Larras Lee, in 1970, *Althofer* (NSW); The Gap, on Cumnock to Larras Lee road, NNW of Molong, Oct 1990, *Henderson & Turpin* H3480 (BRI); *ditto*, Sep 1989, *Henderson & Turpin* H3247 (BRI, NSW); *ditto*, Oct 1990, *Henderson & Turpin* H3481 (BRI); *ditto*, Sep 1989, *Henderson & Turpin* H3248 (BRI, NSW); near Pinecliffe, c. 10 km SW of Molong, Sep 1989, *Henderson & Turpin* H3249 (BRI, CANB, NSW); *ditto*, Oct 1990, *Henderson & Turpin* H3478 (BRI); *ditto*, Oct 1990, *Henderson & Turpin* H3479 (BRI); The Gap, along road to Larras Lee, c. 17 km NW of Molong, Nov 1987, *James* 912 (BRI, NSW); Bohena Creek to Boggabri, Aug 1911, *Jensen* (NSW); *ditto*, Aug 1911, *Jensen* (NSW); c. 9 km SW of Molong, Bocoble Gap, Oct 1992, *Makinson* 1199 (CANB, MEL, NSW); Bocoble Gap, c. 9 km (direct) SW of Molong, Oct 1992, *Makinson* 1198 (BRI, CANB, K, MEL, NSW); *ditto*, Oct 1992, *Makinson* 1197 (BRI, CANB, K, MEL, NSW); Kandos Weir, Aug 1990, *Ollerenshaw* 51 (BRI, CANB); Willala Gap, 55 km S of Narrabri, Dec 1973, *Streimann* HS744 (BRI); *ditto*, Dec 1973, *Streimann* HS741 (AD).

***Distribution and habitat*:** *Bertya oblonga* is confined to central New South Wales in scattered localities from Boggabri southwards to Molong and east to near Denman (Map 19). It is recorded from rocky sites on ridge tops or steep hillsides in open shrubland, eucalypt woodland or forest communities. Soils are recorded as shallow sands or loams overlying sandstone or shale.

***Phenology*:** Flowers have been recorded from July to October, fruits in October and December.

***Affinities*:** *Bertya oblonga* is similar to *B. glandulosa* from the south-east of Queensland. *B. oblonga* can be distinguished from that species by its glabrous adaxial leaf lamina surface, narrowly triangular calyx lobes in the female flower, and the stellate-pubescent abaxial surface of calyx lobes.

***Notes*:** This species as accepted here shows some variation in the width of the leaf laminas. In general, the western populations (e.g. *Jenson* [NSW194891]; *McKay* [NSW465750]) tend to have narrower leaves with a more revolute margin than those in the type material, and collections from near Cumnock (e.g. *Althofer* [NSW194913]; *Henderson & Turpin* H3480) have shorter and broader leaf laminas with the margins less recurved than those in the type material. Although not formally recognized here, this variation warrants further field research.

16. Bertya oleifolia Planch., London J. Bot. 4: 473, t. 16, fig. 1 (1845). **Type:** New South Wales. In arid country on the west of Wellington Valley, in 1825, *A. Cunningham* 49 (holo: K).

Bertya polymorpha Baill., Adansonia 6: 298/301 (1866), *nom. illeg*; *Bertya polymorpha* Baill. forma *polymorpha*, Baill. *loc. cit.*, *nom. illeg*. **Type:** New South Wales. In arid country on the west of Wellington Valley, in 1825, *A. Cunningham* 49 (lecto, here chosen: K).

Ricinocarpos mitchellii Sond., Linnaea 28: 563 (1857); *Bertya mitchellii* (Sond.) Müll.Arg., Linnaea 34: 63 (1865); *Bertya mitchellii* (Sond.) Müll.Arg.var. *mitchellii*, Grüning in A.Engler, Pflanzenr. H.58: 61 (1913). **Type:** [Queensland.] Nov. Holl. subtropica, [without date,] *Sir T. Mitchell* (lecto, here chosen: MEL (ex herb. Sonder) [MEL2062904]; isolecto: MEL [MEL114087, MEL2065936], K).

Bertya polymorpha forma *genuina*, Baill., Adansonia 6: 299 (1866), *nom. inval.*

Bertya mitchellii var. *genuina* Grüning in A.Engler, Pflanzenr. H.58: 61 (1913), *nom. inval.*

Monoecious or sometimes dioecious, much branched shrubs to 2.5 m high, viscid on flowers buds. Branchlets ± terete, with a dense indumentum of stellate hairs, becoming glabrous with age though remaining minutely tuberculate by persistent hair bases; hairs sessile or stipitate with stipes up to 0.3 mm long, white, 0.2–0.4 mm across. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 1.7–4 mm long, with a dense stellate-pubescent indumentum up to 0.2 mm thick; lamina linear-obovate to narrowly obovate or linear-elliptic to narrowly elliptic, 25–54 mm long, 2–8 mm wide; adaxial surface light green or grey-green, sparsely hairy with stipitate stellate hairs up to 0.2 mm across, glabrescent, minutely tuberculate with persistent hair bases; abaxial surface white, densely hairy with sessile and shortly stipitate hairs 0.2–0.5 mm across; margin recurved to revolute; apex acute, obtuse or rounded, rarely ultimately apiculate with extension from midrib up to 0.1 mm long terminated by a small gland; base obtuse to cuneate; midvein impressed adaxially, abaxially raised, angular, densely stellate-pubescent on all surfaces; marginal glands usually present at base of lamina, 1 each side of midrib, 0.1–0.2 mm across, mostly stipitate with stipes up to 0.2 mm long. Inflorescences of a single flower or sometimes umbelliform with 2 flowers, pedunculate, axillary; peduncles up to 1.5 mm long; bracts 7–12, persistent; outer bracts narrowly ovate to ovate, 2.2–5 mm long, 1.5–2.9 mm wide, obtuse to rounded or acute at tip, densely stellate-pubescent abaxially, glabrous or stellate-pubescent distally adaxially; inner bracts ovate to broadly ovate or orbicular, 2.0–4.2 mm long, 2.2–2.7 mm wide, obtuse to rounded at tip, glabrous or stellate-pubescent adaxially. Male flowers sessile or pedicellate with pedicels up to 1.5 mm long, glabrous except for scattered stellate hairs; calyx lobes 5, light green to yellowish coloured, ovate to ovate-elliptic or oblong-elliptic, 4.4–6.6 mm long, 2.5–3.8 mm wide, acute or rounded at tip, glabrous; androecium 4–6.7 mm long, 0.4–0.8 mm across; stamens 32–75; filaments c. 0.1 mm long; anthers 0.9–1.1 mm long. Female flowers sessile or shortly pedicellate with pedicels up to 0.5 mm long and glabrous; calyx 5-lobed, light green coloured; tube 0.3–0.6 mm long; lobes ± equal, erect, recurved distally, narrowly obovate to obovate, oblong-elliptic or elliptic-ovate, 3.3–5.2 mm long in flower, up to 8.3 mm long in fruit, 1.6–2.8 mm wide, acute to obtuse at tip, glabrous or sometimes with scattered stellate hairs abaxially, glabrous adaxially, with margins entire; petals rudimentary, up to 0.6 mm long, ovate or clavate, ± glabrous; ovary subglobose to ellipsoid, 1.5–2.0 mm long, 1.6–1.8 mm across, 3-locular, stellate-pubescent; style with hairy column 0.3–0.8 mm long and 3 spreading limbs; limbs red to maroon, 3.5–4.1 mm long, 0.4–0.7 mm wide, deeply 3– or 4-lobed; lobes 1.5–3.5 mm long, 0.2–0.3 mm wide. Capsule ellipsoid, 6.5–8.5 mm long, 3.8–4.8 mm across, with a sparse to moderately dense indumentum of stellate hairs, usually 1-seeded; persistent calyx lobes > half the capsule length. Seed obloid or obloid-ellipsoid, 4.9–6 mm long, 3.0–3.7 mm wide, 2.2–3.3 mm

across, dark brown and mottled with grey; caruncle pyramidal, 1.6–2.2 mm across, 1.2–1.4 mm long, yellowish-white.

***Selected specimens (from 107 examined)*: Queensland.** SOUTH KENNEDY DISTRICT: 81 km NNE of Jericho, Jul 1993, *Thompson & Figg* GAL171 (BRI). LEICHHARDT DISTRICT: near Get Down, Robinson Gorge, Expedition National Park, Sep 1995, *Forster & Figg* PIF17728 (BRI); 80 km E of Tambo on Springsure road, Sep 1974, *Gittins* 2779 (BRI, NSW); 38.1 km ENE of Taroom, Spring Creek Station, Sep 1996, *Halford & Dowling* Q3114 (AD, BRI, MEL); Carnarvon Gorge National Park, Salvador Rosa section, along track to Spyglass Peak, Aug 1990, *Henderson* H3398 (BRI); Salvator Rosa National Park, Major Mitchell Springs, Sep 1987, *Thomas* 210 (BRI). WARREGO DISTRICT: on 4WD road from Tambo to Springsure via Carwell Station, c. 70 km from Tambo, Oct 1987, *Henderson* H3097 (BRI). MARANOA DISTRICT: 10 miles [c. 16 km] SW of Yuleba on Surat road, Aug 1956, *Everist* 5814 (BRI, CANB). DARLING DOWNS DISTRICT: 26 miles [c. 42 km] E of Westmar, Aug 1961, *Pedley* 796 (BRI, CANB). MORETON DISTRICT: Bulls Falls Lookout, Mt Mee State Forest, W of Mt Mee, Jun 1998, *Bean* 13313 (BRI); E of 'Fair Hills', SW of Cooyar, Aug 1996, *Bean* 10596 (BRI, NSW); Cainbable Road, 16.8 km SSE of Beaudesert, Oct 1997, *Halford* Q3420 (BRI, MEL). **New South Wales.** MacIntyre Falls Fauna and Flora Reserve, c. 22 km NNW of Ashford, Oct 1990, *Coveny & Makinson* 14436 (BRI, CANB, MEL, NSW); 5 km SE of Mt Wambo, Sep 1974, *Coveny & Jacobs* 5597 (AD, BRI, CANB, MEL, NSW); Huntingdale, Capertee Valley, headwaters of Emu Swamp Creek, 4 km E of Genowlan Mountain, Jul 1995, *Crawford* 3067 (CANB); Shoalhaven River, c. 4 km downstream from Tallowa Dam, Nov 1988, *Davies & Richardson* 724 (BRI, CANB, MEL, NSW); c. 2 miles [3.6 km] E of Doyle's Creek (W of Jerry's Plains), Sep 1965, *Johnson* (NSW); "Darrowby", 3.5 km W of Broke along the Milbrodale Road, Hunter Valley, Aug 1985, *Palmer* 34 (CANB); Goulburn R. (Karrabee - Bylong) Hunter Valley, Apr 1983, *Tame* 958 (NSW); Darkey Creek, S of Milbrodale, Windsor/Singleton road, Sep 1972, *Williams* (BRI, CANB, NSW).

***Distribution and habitat*:** *Bertya oleifolia* is widespread in eastern Australia from Jericho, in central Queensland, southwards to Ashford, in northern New South Wales, and further south from Rylstone to Nowra, in southern New South Wales (Map 20). It grows in a variety of community types including tall open shrubland, woodland and open forest communities. Soils are recorded as mostly sandy often rocky and overlying sandstone substrates.

***Phenology*:** Flowers have been recorded from May to November, fruits from August to December.

***Notes*:** To fix the application of Baillon's illegitimate *Bertya polymorpha*, the holotype of *B. oleifolia* Planch., included by Baillon in his concept of *B. polymorpha*, is here selected as lectotype of Baillon's name.

The name *Bertya mitchellii* (Sond.) Müll.Arg. has been misapplied in the past (Bentham 1873, Weber 1986, James and Harden 1990, Jeanes 1999) to a taxon that is widespread in southern Australia here referred to as *B. tasmanica* subsp. *vestita.*

The misapplication appears to have been initiated by Jean Müller (1865) when he transferred *Ricinocarpos mitchellii* Sond. to *Bertya*. There, he cited Sonder's original name and place of publication as well as a specimen "Murray-River (F. Mueller in hb. Hook.)".

Sonder's *Ricinocarpos mitchellii* is based on a Major T. Mitchell collection from near Mantuan Downs in central Queensland and J. Müller's new name is therefore typified by the type of its basionym. An examination of Ferdinand Mueller's collection from the Murray River and the type of *Ricinocarpos mitchellii* Sond. revealed that they are not of the same taxon. Mueller's collection labelled 'Murray River' is referable to the taxon here named *B. tasmanica* subsp. *vestita*, while Mitchell's collection from Mantuan Downs is referable to the species *B. oleifolia* as circumscribed here.

17. Bertya opponens (F.Muell. ex Benth.) Guymer, Austrobaileya 2(2): 147 (1985); *Croton opponens* F.Muell. ex Benth., Fl. Austral. 6: 125/6 (1873). **Type:** Queensland. [without date and name of collector] (holo: MEL [MEL604903]).

Bertya oppositifolia F.Muell. & O'Shanesy, S. Sci. Rec. 2(5): 98 (1882). **Type:** [Queensland.] on sandy ridge west of Nogoa-River, in 1879, *P.A. O'Shanesy* (lecto: MEL [MEL104213], *fide* G.P. Guymer, Austrobaileya 2(2): 147 (1985)).

Bertya species A, James & Harden (1990, p. 418).

***Illustration*:** G.M. Cunningham *et al.* (1982, p. 453).

Monoecious or dioecious, much branched shrubs or small trees up to 5 m high, viscid on flower buds. Branchlets ± terete, with a dense indumentum of stellate hairs, somewhat floccose, becoming glabrous with age; hairs sessile or stipitate with stipes up to 0.8 mm long, mostly white or sometimes pale rusty-brown, 0.2–0.8 mm across. Leaves petiolate, opposite or sometimes subopposite, spreading; petiole plano-convex, 4–9 mm long, with a dense stellate-pubescent indumentum up to 0.2 mm thick; lamina narrowly elliptic to elliptic, oblong-elliptic, narrowly oblong or narrowly oblong-obovate, (25–)35–72 mm long, 6–22 mm wide; adaxial surface green to dark green, with a sparse to moderately dense indumentum of sessile or shortly stipitate stellate hairs 0.2–0.4 mm across, glabrescent, smooth or minutely tuberculate with persistent leaf bases; abaxial surface mostly white or sometimes pale rusty brown along midrib, densely hairy with sessile and stipitate stellate hairs 0.4–1.0 mm across; margin slightly to distinctly recurved; apex rounded or obtuse; base obtuse or slightly attenuate; midvein impressed adaxially, abaxially raised and ± rounded, densely stellate-pubescent; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.2 mm across, sessile or stipitate with stipes 0.2–0.5 mm long. Inflorescences of a single flower or umbelliform with 2 or 3 flowers, pedunculate, axillary; peduncles up to 2 mm long; bracts 4–7, persistent, oblong or ovate to broadly ovate, 2–4.4 mm long, 1.9–3 mm wide, rounded to obtuse or acute at tip, densely stellate-pubescent to glabrous abaxially, mostly glabrous adaxially. Male flowers sessile; calyx lobes 4 (sometimes 5), of unknown colour when fresh, elliptic, 7–9.5 mm long, 4–6.5 mm wide, rounded at tip, glabrous; androecium 6.0–13.0 mm long, 1.5–1.7 mm across; stamens 77–114; filaments 0.1–0.5 mm long; anthers 1.3–1.8 mm long. Female flowers sessile or rarely pedicellate with pedicels up to 2 mm long and glabrous; calyx 4(rarely 5)-lobed, light green coloured; tube 0.4–1 mm long; lobes equal or unequal, erect, recurved distally, ovate to broadly ovate, 5–5.7 mm long, 3.4–5.2 mm wide, obtuse to rounded at tip, glabrous, with margins entire; petals rudimentary, up to 1.6 mm long and 0.7 mm wide, ovate, glabrous; ovary subglobose, 1.8–2.8 mm long, 1.8–2.1 mm across, 3-locular, densely stellate-villose; style with hairy column 0.4–1.0 mm long and 3 spreading limbs; limbs yellow-green to red, 5–8 mm long, 1–2 mm wide, deeply 4– to 6(rarely 8)-lobed; lobes 1.8–5.5 mm long, 0.3–0.7 mm wide. Capsule ovoid to subglobose, 9–14 mm long, 9–13 mm across, densely stellate-villose, usually 3-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid, 7.5–8.9 mm long, 3.8–4.0 mm wide, 2.8–3.1 mm across, light to dark brown; caruncle pyramidal, c. 2.6 mm across, c. 1.8 mm long, yellowish-white.

***Selected specimens (from 48 examined)*: Queensland.** Burke District: Bertya Creek, W of 'Warang', White Mountains National Park, Jun 1992, *Bean* 4614 (BRI, NSW). Leichhardt District: Fairbairn Dam, Emerald, Jul 1981, *Williams* 81013 (BRI). Port Curtis District: Kroombit Creek, Kroombit Tops, Oct 1995, *Brushe & Brushe* JB242 (BRI); Mt Castletower, Many Peaks Range, Jun 1977, *Telford* 5481 (BRI, CANB, NSW); 15 km NE of Biloela, 3 km N of Callide Dam, Jul 1992, *Thompson* BIL18 (BRI, CANB, NSW). Burnett District: 300 m S of Scrubby Dam, Coominglah State Forest, Sep 1995, *Bean & Robins* 8895 (BRI, NSW); State Forest 172, near Meredith's Road, Gurgeena Plateau, Nov 1994, *Forster* PIF15909 (BRI). Warrego District: Mount Mobil Holding, 15-20 km W of Umberill Homestead, Nov 1990, *Grimshaw* CHR17 (BRI); c. 36 km NNE of Morven, along dogfence, Aug 1990, *Henderson et al.* H3392 (BRI). Maranoa District: Thomby Range, SE of Surat, May 1960, *Blake* 21306 (BRI, NSW); Thomby Range, c. 43 km SE of Surat, on "Glen Fosslyn" Station, Aug 1990, *Henderson & Franks* H3377 (BRI). Darling Downs District: State Forest 101, c. 7 km due N of Coolmunda Dam, Jun 1994, *Grimshaw & Taylor* PG823 (BRI, NSW). Moreton District: East of Egypt, 25 km E of Gatton, Oct 1991, *Bird* (BRI, NSW); Falls Creek, 4 km NW of West Haldon, Nov 1988, *Forster* PIF4761 & *Bird* (BRI); Crest of mountain spur to S of crossing of Heifer Creek on Gatton to Clifton Road, Aug 1990, *Henderson et al.* H3374 (BRI). **New South Wales.** "Devils Face", c. 2 km E of Jessie Smith trig., Kangaroo River State Forest, Jan 1999, *Austin* (BRI); 5 km SW of Turrawan, 20 km SE of Narrabri, *Briggs* 4694 (NSW); "Elmore", Coolabah, Feb 1973, *Cunningham* 594 (NSW); "Windera", Cobar, Jul 1969, *Cunningham* (NSW); Ridge above Barool Creek, Gibraltar Range State Forest, Aug 1991, *Binns* 1774 (NSW).

***Distribution and habitat*:** *Bertya opponens* is widely scattered in eastern Australia from near Charters Towers, in north-east Queensland, southwards to Cobar and Coffs Harbour, New South Wales (Map 21). It is recorded growing in a variety of community types including mixed shrubland, lancewood woodland, mallee, eucalypt/*Acacia* open forest with shrubby understorey, eucalypt/*Callitris* open woodland and semi-evergreen vine-thicket. The soils are recorded as generally shallow

sandy loams or red earths associated mostly with sandstone, but also with rhyolite, shale or metasediments.

***Phenology*:** Flowers have been recorded from June to November, January and March, fruits between August and November.

***Notes*:** *Bertya opponens* is characterized by having a dense stellate-pubescent indumentum on young branchlets and leaves, calyx lobes in female flowers ovate to broadly ovate, ovary densely hairy, capsule mostly 3-seeded and leaves consistently opposite.

As circumscribed here, *B. opponens* has considerable variation in its habit, indumentum colour and leaf shape. In general the northern populations (from Emerald to near Toowoomba, Queensland) tend to have broader, oblong to oblong-elliptic leaf laminas with usually flat margins while the southern populations from Morven and Surat, Queensland and those throughout New South Wales have narrower, linear-elliptic to narrowly elliptic leaf laminas with revolute margins. However, these variations tend to intergrade and are not considered worthy of formal recognition.

The indumentum of this species is mostly white, but there are a number of collections (e.g. from between Grafton and Coffs Harbour, *Austin* (BRI), and from near Toowoomba, *Forster* PIF4761 & *Bird* (BRI) and *Henderson* H3375 (BRI)) that have a rusty-brown indumentum on most parts but particularly on young branchlets. Whether or not these forms are worthy of formal recognition warrants further study.

18. Bertya pedicellata F.Muell., Fragm. 4: 143/144 (1864). **Type:** [Queensland.] Rockhampton, [without date,] [*A.*] *Thozet* (lecto, here chosen: MEL [MEL114092]).

Bertya glabrescens (C.T.White) Guymer, Austrobaileya 2(5): 429 (1988*); Bertya oleifolia* var. *glabrescens* C.T.White, Proc. Roy. Soc. Queensland 50: 86 (1939). **Type:** [Queensland. BURNETT DISTRICT:] Eidsvold, [without date,] *T.L. Bancroft* (holo: BRI [AQ342448, sheet 1]; iso: BRI [AQ342448, sheet 2], ?K *n.v.*, *fide* G.P. Guymer, Austrobaileya 2(5): 429 (1988)).

Monoecious, much branched shrubs up to 6 m high, thinly viscid on young shoots, leaves and flowers. Branchlets ± terete, with a moderately dense indumentum of stellate hairs, becoming glabrous with age, rugose; hairs ± sessile, white, 0.2–0.3 mm across. Leaves petiolate, spirally alternate or opposite, spreading; petiole ± plano-convex, 1.5–5.2 mm long, with a sparse stellate-pubescent indumentum up to 0.1 mm thick; lamina linear-elliptic, linear-obovate or sometimes linear, 40–92 mm long, 1.6 3–10 mm wide; adaxial surface green, sparsely hairy with stellate hairs up to 0.3 mm across, glabrescent, smooth; abaxial surface white, densely hairy with ± sessile stellate hairs 0.2–0.6 mm across; margin recurved or sometimes revolute at least in dried state; apex acute or obtuse, ultimately apiculate with an extension from midrib up to 0.2 mm long terminated with small gland; base attenuate; midvein impressed adaxially, abaxially raised and angular, with stellate hairs on abaxial face, becoming glabrous, stellate-pubescent laterally; marginal glands present at base of lamina, 1 each side of mibrib, c. 0.1 mm across, sessile or stipitate with stipes up to 0.1 mm long. Inflorescences of a single flower or umbelliform with 2 flowers, subsessile or pedunculate, axillary; peduncles up to 6 mm long; bracts 6–9, ± persistent but falling off before the fruit matures, narrowly ovate to ovate or oblong, 2.4–3.7 mm long, 0.5–2.1 mm wide, acute to obtuse at tip, stellate-pubescent to glabrous abaxially, glabrous adaxially. Male flowers sessile; calyx lobes 5(rarely 4 or 6), yellow-green coloured, elliptic or ovate-elliptic, 4.5–5.5 mm long, 3–4.2 mm wide, rounded at tip, glabrous; rudimentary petals sometimes present when up to 2 mm long; androecium 5–8 mm long, 0.7–1.3 mm across; stamens 56–70; filaments c. 0.1 mm long; anthers 0.8–1.1 mm long. Female flowers pedicellate; pedicels 1.5–3 mm long in flower, to 4 mm long in fruit, glabrous; calyx 4(rarely 5)-lobed, light green coloured; tube 0.2–0.4 mm long; lobes equal, erect, recurved distally, narrowly ovate or oblong-ovate, 3.2–5.2 mm long in flower, up to 7.5 mm long in fruit, 0.9–1.7 mm wide, acute to rounded at tip, glabrous, with margins entire; petals rudimentary, up to 2 mm long and 0.9

mm wide, ovate, glabrous; ovary ovoid or ellipsoid, 1.5–3.1 mm long, 1.1–2.2 mm across, 3(rarely 4)-locular, usually with scattered stellate hairs; style with ± glabrous column 0.3–0.4 mm long and 3(rarely 4) ascending limbs; limbs red to maroon or pale yellow, 3.3–4.1 mm long, 0.5–0.8 mm wide, deeply 3- to 5-lobed; lobes 1.3–2.2 mm long, 0.2–0.4 mm wide. Capsule narrowly ellipsoid or narrowly ovoid, 8.5–11.3 mm long, 4.7–5.2 mm across, glabrous or with scattered stellate hairs, usually 1-seeded; persistent calyx lobes > half the capsule length. Seed obloid or obloid-ellipsoid, 5.1–5.8 mm long, 3.2–3.6 mm wide, 2.8–3.1 mm across, light brown and mottled with dark brown and black; caruncle pyramidal, 2.0–2.1 mm across, 1.3–1.7 mm long, creamy-white.

***Selected specimens (from 38 examined)*: Queensland.** LEICHHARDT DISTRICT: just below the summit of Ropers Peak, NE of Capella, Aug 1987, *Bean* 631 (BRI); Ropers Peak, Peak Range, Aug 1990, *Forster* PIF7207 (BRI); 25.1 km ENE of Taroom, Beaumont Station, Nov 1996, *Halford & Dowling* Q3221 (BRI, NSW); on Nebo-Clermont road, 80 km from Nebo, May 1962, *Johnson* 2368 (AD, BRI, CANB, NSW); Grey Rock, Glenlea Road, WNW of Springsure, Jul 1989, *O'Keeffe* 889 (BRI). PORT CURTIS DISTRICT: Mt Hedlow, 16 km W of Yeppoon, Jun 1983, *Anderson* 3442 (BRI); Prospect Peak, c. 35 km S of Biloela, Jun 1996, *Bean* 10439 (BRI, MEL, NSW); Prospect Peak, c. 35 km S of Biloela, Jun 1996, *Bean* 10438 (BRI, MEL, NSW); Mt Jim Crow, Aug 1980, *Hind & Ingram* 2663 (NSW); Ironpot/Bluff Rock Island off Kemp Beach, Sep 1996, *Melzer* RM750 (BRI); Rosslyn Head, Jul 1997, *Rider* (BRI). BURNETT DISTRICT: Mt Gayndah, 7 km W of Gayndah, Sep 1999, *Forster et al.* PIF24864 (BRI); 4.5 km S of Binjour, Sep 1989, *Forster & Bean* PIF5743 (BRI); Coongara Rock, May 1996, *Grimshaw & Baumgartner* PG2395 (BRI, MEL); northern boundary of SF 132, 35 km SSW of Mundubbera, Jul 1997, *Halford & Holland* Q3295 (BISH, BRI, MEL); 4 km W along Humphrey Road from Burnett Highway, Aug 1990, *Henderson & Franks* H3400 (BRI); 4.5 km S of Binjour, on road to Humphrey, Oct 1989, *Ross* 8914 (BRI, NSW). DARLING DOWNS DISTRICT: Lot 1656 Parish of Rosenthah, Shire of Warwick, May 1995, *Sands* 3 (BRI).

***Distribution and habitat*:** *Bertya pedicellata* is confined to central and south-east Queensland, from near Aramac eastwards to Rockhampton and south to near Biggenden with an isolated record from the Warwick district (Map 22). It is recorded as growing on rocky hillsides in eucalypt forest or woodland, *Acacia* woodland or shrubland, and open heathland or vine thicket communities. Soils are recorded mostly as skeletal to shallow sandy, sandy clay or clay loams overlying rhyolite, trachyte or sandstone substrates.

***Phenology*:** Flowers have been recorded from March to November, fruits from August to November.

***Typification*:** In the protologue of *Bertya pedicellata*, Mueller (1864) cited "in thickets near the town of Rockhampton, Thozet". Four collections at MEL and one amongst material on loan to BRI from K have been located that are labelled *B. pedicellata* and have Thozet as the collector with the locality of collection as Rockhampton. Three of the MEL sheets are without a date of collection while the fourth is dated 1865. As this date is after Mueller's publication of the name *B. pedicellata*, this sheet has been excluded from consideration as type material. Although the K sheet is dated 1872, we believe this is the date when it was sent to K. The K sheet and the remaining three sheets at MEL are here assumed to be original material available to Mueller prior to his publication of *B. pedicellata*. From these, the MEL sheet MEL114092 is chosen here as lectotype because it agrees with the protologue and is the most ample of the three MEL type sheets, as well as the K one.

***Notes*:** *Bertya pedicellata* is characterized by the more or less sessile stellate hairs on the branchlets, the opposite as well as alternate arrangement of its leaves, the mostly linear-elliptic or linear-obovate leaf laminas which are glabrescent and smooth on the adaxial surface, and its long-pedicellate female flowers.

The leaf laminas can vary in width seemingly depending on the moisture available to the plant at any particular site. Plants on dry skeletal soils tend to have a large proportion of narrow leaf laminas with margins recurved or revolute to some extent and sometimes even to the midrib, whereas plants on sloping sites and sandy loam soil tend to have leaf laminas flatter and slightly broader.

A collection from near Warwick, Queensland, *Sands* 3 (BRI), is from a population disjunct from others of *B. pedicellata* and it has extremely narrow leaf laminas. This population warrants further study to establish the significance of these differences.

The O'Keeffe collection from WNW of Springsure, *O'Keeffe* 889 (BRI), has male flowers with what we interpret to be rudimentary petals near the base of the staminal column. This is the only *Bertya* specimen that has been observed to have rudimentary petals in male flowers.

19. Bertya pinifolia Planch., London J. Bot. 4: 473 (1845). **Type:** [Queensland. MORETON DISTRICT:] Brisbane River [Minto Crags], in 1829, *Fraser* 158 (lecto, here chosen: K).

Monoecious, much branched shrubs up to 2 m high, viscid throughout. Branchlets somewhat angular, becoming terete with age, glabrous, tuberculate. Leaves petiolate, spirally alternate, ascending to spreading; petiole plano-convex, 0.7–1.6 mm long, glabrous, sparsely tuberculate; lamina linear, 25–60 mm long, 0.8–1.5(–2.1) mm wide, slightly recurved at tip; adaxial surface green, glabrous, tuberculate; abaxial surface white, densely hairy with sessile and stipitate stellate (0.4–0.5 mm across) and simple glandular (up to 0.05 mm long) hairs; margin revolute or recurved to midrib concealing abaxial leaf lamina surface; apex acute, ultimately apiculate with an extension from the midrib up to 0.2 mm long terminated with a small, light brown gland; base cuneate; midvein impressed adaxially, abaxially raised and angular, tuberculate and glabrous on abaxial face, stellate-pubescent laterally; marginal glands usually present at base of lamina, 1 each side of midrib, 0.15–0.2 mm across, sessile. Inflorescences of a single flower, pedunculate, axillary; peduncles up to 1.5 mm long; bracts 5–7, persistent, narrowly ovate to ovate, 1.7–3.5 mm long, 0.6–1.5 mm wide, acute or obtuse at tip, glabrous. Male flowers shortly pedicellate; pedicels up to 0.8 mm long, glabrous; calyx lobes 5, yellow-green, ovate-elliptic to elliptic, 3–4.8 mm long, 1.7–2.6 mm wide, rounded at tip, glabrous; androecium 3.5–6.2 mm long; 0.4–0.6 mm across; stamens 30–45; filaments c. 0.1 mm long; anthers 0.8–1.4 mm long. Female flowers subsessile; calyx 5-lobed, yellow-green coloured; tube up to 0.2 mm long; lobes equal, erect, elliptic to oblong-elliptic, 2.9–3.6 mm long in flowers, up to 9 mm long in fruit, 1.3–1.9 mm wide, rounded at tip, glabrous, with margins fimbriate; petals rudimentary, up to 0.3 mm long and 0.2 mm wide, ovate, glabrous; ovary ovoid, 1.1–1.3 mm long, 1.0–1.2 mm across, 3-locular, glabrous; style with glabrous column 0.5–1 mm long and 3 spreading limbs; limbs red, 3.0–4.2 mm long, 0.4–0.6 mm wide, deeply 3– or 4-lobed; lobes 1.3–2.9 mm long, 0.2–0.3 mm wide. Capsule narrowly ellipsoid, 7–7.5 mm long, 3.2–3.5 mm across, glabrous, usually 1-seeded; persistent calyx lobes longer than the capsule. Seed obloid, 4.7–5.2 mm long, 2.7–2.8 mm wide, 2.3–2.4 mm across, dark red; caruncle pyramidal, 1.2–1.4 mm across, 0.7–0.8 mm long, creamy-white.

***Selected specimens (from 10 examined)*: Queensland.** MORETON DISTRICT: Black Rock Creek Road, 12 km S of Boonah, Aug 1990, *Bird* & *Orford* A (BRI, NSW); *ditto*, Aug 1990, *Bird* & *Orford* B (BRI, NSW); *ditto*, Aug 1990, *Bird* & *Orford* C (BRI, NSW); *ditto*, Jul 1988, *Bird* (BRI, CANB, NSW); 2 km SSE of Mt Bangalora, Sep 1987, *Forster et al.* PIF3036 (BRI, NSW); Flagstone Creek, Boonah District, Sep 1934, *Michael* 2050 (BRI); E of Moogerah Dam on Boonah Road, Dec 1998, *Olsen* (BRI).

***Distribution and habitat*:** *Bertya pinifolia* is confined to the south-east of Queensland, where it is restricted to rocky sites in the Boonah district (Map 23). It is recorded as growing in open heath or shrubland communities on rocky ridges or mountain summits on skeletal soils overlying rhyolite.

***Phenology*:** Flowers have been recorded from July to September, fruits in September.

***Affinities*:** *Bertya pinifolia* seems most closely related to *B. gummifera*, *B. granitica* and *B. recurvata* but differs from all three species in having proportionally longer leaves (leaf lamina length/width ratio greater than 30:1 compared with less than 25:1). For further differences between *B. pinifolia* and each of these three species, refer to the 'affinities' section under the species concerned.

***Typification*:** Two sheets of original material of *B. pinifolia* were located amongst material on loan to BRI from K. Both sheets have been stamped as originating from Hooker's herbarium. Each has what appears to be a field label written by the same hand stating "Brisbane River, [illegible], Fraser 1829, 158" and "Croton rosmarinifolia, [illegible], Fraser 1829, 155" respectively. Both specimens agree with the protologue of *B. pinifolia*. The

specimen labelled 158 is chosen here as the lectotype as it is annotated with the name *B. pinifolia* in what we believe to be Planchon's hand.

20. Bertya polystigma Grüning in A.Engler, Pflanzenr. H.58: 57-59 (1913). **Type:** "N. Queensland. Walshs Pyramid. in stone ground between low shrub (*L. Diels* n. 8341)" (holo: B, apparently destroyed; lecto, here chosen: G. Grüning in A. Engler, Pflanzenr. H.58: 58, fig. 11 (1913); epitype, here chosen: Queensland. Cook District: Massey Creek Falls, S of Gordonvale, 18 February 1996, *R.L. Jago & R. Jensen* 3788 (BRI)).

Illustration: G. Grüning (1913: p. 58, fig. 11).

Monoecious, much branched shrubs up to 3(6) m high. Branchlets ± terete, with a dense indumentum of stellate hairs, becoming glabrous with age; hairs sessile or stipitate with stipes up to 0.4 mm long, white, 0.4–0.7 mm across. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 1.2–4.5 mm long, with a dense stellate-pubescent indumentum up to 0.7 mm thick; lamina lorate to narrowly oblong or narrowly oblong-elliptic, 18–54 mm long, 2.4–5.3(–8.6) mm wide; adaxial surface green, sparsely hairy with sessile or stipitate stellate hairs 0.3–0.6 mm across, glabrescent, smooth or minutely tuberculate with persistent hair bases; abaxial surface white, densely hairy with sessile or shortly stipitate stellate hairs 0.4–0.5 mm across; margin recurved to revolute; apex acute, rounded to obtuse, sometimes ultimately apiculate with an extension from midrib up to 0.1 mm long and terminated with a small, light brown coloured gland; base cuneate; midvein impressed adaxially, abaxially raised and angular, stellate-pubescent; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.15 mm across, stipitate with stipes up to 0.1 mm long. Inflorescences of a single flower or rarely umbelliform with 2 flowers, pedunculate, axillary or rarely terminal on much reduced axillary branchlets; peduncles 1–4 mm long; bracts 4–6, persistent; outer bracts lorate or ovate, 2.5–3.5 mm long, 0.9–1.4 mm wide, rounded at tip, stellate-pubescent on both surfaces; inner bracts ovate to broadly ovate or orbicular, 0.9–2.2 mm long, 0.9–1.4 mm wide, acute to obtuse at tip, glabrous or with scattered stellate hairs distally abaxially. Male flowers pedicellate; pedicels 0.5–1 mm long, stellate-pubescent; calyx lobes 5, light green coloured, oblong-elliptic, 4.5–5.1 mm long, 2.5–2.9 mm wide, rounded at tip, glabrous; androecium 5–8 mm long, 0.5–0.8 mm across; stamens 57–73; filaments 0.1–0.2 mm long; anthers 1–1.3 mm long. Female flowers sessile or shortly pedicellate with pedicels up to 0.4 mm long, glabrous; calyx 5-lobed, light green coloured; tube 0.3–0.4 mm long; lobes equal, erect to spreading, recurved distally, narrowly ovate to ovate, 1.9–3.1 mm long, 1.0–1.6 mm wide, obtuse at tip, glabrous, with margins fimbriate; petals rudimentary, ovate, up to 0.4 mm long and 0.1 mm wide, glabrous; ovary ovoid, 1.0–1.3 mm long, 0.9–1.0 mm across, 3-locular, stellate-tomentose; style with hairy column c. 0.3 mm long and 3 spreading limbs; limbs pale yellow or red, 2.4–3.5 mm long, 0.6–0.7 mm wide, deeply 3- or 4-lobed; lobes 1.3–3.0 mm long, 0.1–0.2 mm wide. Capsule ellipsoid, 5.9–7.1 mm long, 3.5–3.8 mm across, usually with scattered stellate hairs, usually 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid, 5.0–5.2 mm long, 2.7–2.8 mm wide, 2.2–2.4 mm across, light brown to reddish brown; caruncle pyramidal, 1.2–1.8 mm across, 0.8–1 mm long, creamy-white.

***Selected specimens (from 29 examined)*: Queensland.** Cook District: Carrington Falls, SSW of Atherton, Jan 1993, *Bean* 5708 (BRI); Emu Creek, c. 10 miles [16 km] SW of Mareeba, Apr 1967, *Brass* 33533 (BRI, K); Atherton district, R 99W, Dec 1958, *Dansie & Volck* 1491 (BRI, CANB); Bakers Blue Mountain, Font Hills Station, Mona Creek Saddle, Dec 1988, *Fell* DF1564 (BRI); Daintree National Park, Little Daintree River, May 1998, *Forster et al.* PIF22825 (BRI); State Forest 144, Mt Windsor Tableland, Jul 1995, *Forster & Figg* PIF17427 (BRI); State Forest 185, Danbulla, 6 km along C road, Jan 1993, *Forster & Bean* PIF13077 (BRI); State Forest 607, Dinden, Bridle Logging Area, Jul 1995, *Forster et al.* PIF17351 (BRI); 5 km W of Rifle Range, Atherton, May 1976, *Hassall* 7623 (BRI); Carrington Falls, c. 8 km SSW of Atherton, Apr 1989, *Henderson & Clarkson* H3224 (BRI); near dam wall of Wild River Reservoir, c. 12 km SSW of Atherton, Apr 1989, *Henderson & Clarkson* H3219 (BRI); S.F.R. 194, Oct 1973, *Hyland* 6910 (BRI, CANB, K, NSW); Reserve 99, between Atherton and Herberton, Jun 1961, *Hyland* 1872 (BRI); Carrington Falls, Feb 1975, *Hyland* 8075 (BRI, CANB, K, NSW); Massey Creek Falls, S of Gordonvale, Feb 1996, *Jago*

& *Jensen* 3788 (BRI); between Barron and Walsh Rivers, c. 6 miles [10 km] W of Atherton, Apr 1959, *Thorne & Dansie* 20741 (BRI); Davies Creek area, Jan 1962, *Webb & Tracey* 5653 (BRI). NORTH KENNEDY DISTRICT: Herberton, Jan 1912, *Kenny* (BRI); 4.5 km N of Ravenshoe, Jul 1978, *Lockyer* 158 (BRI).

***Distribution and habitat*:** *Bertya polystigma* is confined to the north-east of Queensland, from Mt Windsor Tableland southwards to Ravenshoe (Map 24). It is recorded as growing on coarse sandy soils in rocky granitic habitats in a variety of vegetation types including eucalypt woodland and open or closed forest and less frequently in open *Syncarpia* forest or rainforest.

***Phenology*:** Flowers have been recorded in October to July, fruits in January, May, July, September and October.

***Affinities*:** *Bertya polystigma* seems most closely allied to *B. ingramii* and *B. oleifolia*. It differs from *B. ingramii* in having a smooth adaxial leaf lamina surface, longer indumentum on stems and abaxial leaf lamina surfaces, and the midrib impressed on the upper leaf lamina surface. *B. polystigma* differs from *B. oleifolia* in its calyx lobes which do not enlarge as the fruit matures.

***Typification*:** It seems reasonable to assume that the collection referred to by Grüning in his protologue of *B. polystigma* (*Diels* n.8341) was at B where Diels' herbarium was located. No type material has been located at B and it is believed to have been destroyed during the Second World War. Searches for duplicates at other herbaria (BM, MEL and CANB) where duplicates may exist according to Stafleu and Cowan (1976) have been unsuccessful. As there appears to be no extant holotype or isotype material available, the illustration in the protologue is here selected as lectotype, in accordance with article 9.10 of the International Code of Botanical Nomenclature (ICBN) (Greuter *et al.* 2000). Grüning's description and illustration are clearly diagnostic and leave no doubt as to the application of the name. However, to enable the precise taxonomic interpretation of this type, we also designate an epitype (Art. 9.7).

21. Bertya pomaderroides F. Muell., Fragm. 4: 34/35 (1863); *Bertya pomaderroides* F.Muell. var. *pomaderroides*, Blakely, Contr. New South Wales Natl Herb. 1: 121 (1941). **Type:** [New South Wales.] Bent's Basin, [without date,] *W. Woolls* (lecto, here chosen: MEL [MEL114101]; isolecto: K, MEL [MEL114102, MEL114100, MEL114099], NSW [NSW194854]).

Bertya oblongifolia Müll.Arg., Flora 47(30): 471 (1864). Type: [Australia, without locality, without date,] *C. Stuart* (holo: K (ex herb. Hook.)).

Bertya pomaderroides var. *angustifolia* Blakely, Contr. New South Wales Natl Herb. 1: 121 (1941). Type: New South Wales. Woronora River, 15 Sep 1923, *E. Cheel* [NSW194873] (holo: NSW).

Illustration: G. Grüning (1913: p. 55, fig. 10A) as *Bertya oblongifolia*.

Monoecious, much branched shrubs up to 2 m high, sometimes viscid on very young buds. Branchlets ± terete, with a moderately dense indumentum of stellate hairs, becoming glabrous with age though remaining tuberculate by persistent hair bases; hairs sessile or stipitate with stipes up to 0.3 mm long, pale golden-yellow to white, 0.2–0.5 mm across. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 1.5–4.8 mm long, slightly grooved adaxially, with a moderately dense stellate-pubescent indumentum up to 0.1 mm thick; lamina narrowly elliptic, oblong-elliptic to narrowly oblong-elliptic or rarely narrowly obovate, 16–46 mm long, 4–13 mm wide; adaxial surface green, glabrous, smooth; abaxial surface white, densely hairy with sessile stellate hairs 0.3–0.4 mm across; margin flat, recurved or sometimes revolute; apex rounded to obtuse rarely or acute; base obtuse to cuneate; midvein impressed adaxially, abaxially raised and angular or rounded, stellate-pubescent; marginal glands present at base of lamina, 1 each side of midrib, 0.1–0.2 mm across, sessile. Inflorescences of a single, flower, pedunculate, axillary; peduncles 8–16 mm long; bracts 3–5, persistent to somewhat caducous, narrowly ovate, narrowly triangular or lorate, 1.5–3.5 mm long, 0.6–1.3 mm wide, acute or obtuse at tip, glabrous or stellate-pubescent abaxially.

Male flowers sessile or pedicellate with pedicels up to 2 mm long, glabrous; calyx lobes 5, light green, elliptic or ovate, 3.1–3.8 mm long, 1.7–2.6 mm wide, rounded or obtuse at tip, glabrous; androecium 6.0–6.7 mm long, 0.6–0.8 mm across; stamens 56–75; filaments 0.1–0.2 mm long; anthers 1.1–1.3 mm long. Female flowers sessile or pedicellate with pedicels 0.2–1.5 mm long, glabrous or stellate-pubescent; calyx 5-lobed, light green coloured; tube 0.2–0.4 mm long; lobes equal, erect, narrowly triangular, 2.1–2.7 mm long, 0.6–0.8 mm wide, acute at tip, glabrous, with margins entire; petals absent; ovary narrowly ovoid or ellipsoid, 1.5–2.5 mm long, 1.0–1.3 mm across, 3-locular, glabrous or with scattered stellate hairs distally; style with hairy column c. 0.1 mm long and 3 spreading limbs; limbs red, 2.3–2.8 mm long, 0.2–0.4 mm wide, deeply 3– to 5-lobed; lobes 0.9–2.2 mm long, 0.1–0.2 mm wide. Capsule narrowly ovoid, 6.5–9.8 mm long, 3–4.1 mm across, glabrous or with scattered stellate hairs, usually 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid or obloid-ellipsoid, 5.5–6.2 mm long, 2.7–3.2 mm wide, 2.4–2.9 mm across, dark red; caruncle pyramidal, c 1.5 mm across, c. 1.5 mm long, yellowish-white.

***Selected specimens (from 41 examined)*: New South Wales.** Kangaroo River in National Park, Sep 1893, *Betche* (NSW); Nepean River catchment, near Menangle, Apr 1962, *Burgess* (CANB); Bargo River, Apr 1962, *Burgess* (CANB); Hilltop, Jul 1914, *Cheel* (BRI, NSW); Georges River, Sep 1896, *Clarke* (NSW); Woronora River, Sep 1896, *Clarke* (NSW); St Helena, 4 miles [c. 6 km] S of Springwood, Nov 1960, *Constable* (NSW); Glenbrook Creek, Chambers Gorge, 1 mile [c. 1.6 km] SE of Glenbrook, Oct 1965, *Coveny* (NSW); Kangaroo Creek, Royal National Park, Sep 1966, *Coveny* (NSW); Scouter's Mountain track crossing at Heathcote Creek, Heathcote National Park, Sep 1983, *Coveny & Bishop* 11617 (NSW); Glenbrook Creek, Glenbrook, Blue Mountains National Park, Feb 1998, *Coveny & Jobson* 17616 (CANB, NSW); The Woolwash, Campbelltown, Sep 1983, *Coveny & Bishop* 11619 (NSW); Georges River, Oct 1894, *Fletcher* (NSW); Morton National Park, Northern Budawang Range, c. 3 km NW of "The Castle", Oct 1985, *Gilmour* 5282 (CANB); Cataract Dam, Sep 1908, *Maiden* (NSW); Luncheon Creek, Jerrawangala State Forest, Sep 1985, *Mills* (NSW); ridge SW of Gadara Point, Northern Budawang Range, Feb 1974, *Olsen* 1875 (NSW); c. ½ way down Nepean Gorge from Glenbrook, Sep 1961, *Pearce* (NSW); Northern Budawang Range, gorge below Crooked Falls, Jan 1986, *Telford* 10177 (CANB, MEL, NSW); Little River, Buxton, Sep 1951, *Whaite* 1081 (NSW).

***Distribution and habitat*:** *Bertya pomaderroides* is confined to the south-east of New South Wales, from Glenbrook southwards to Budawang Range (Map 25). It is recorded as growing in open eucalypt forest usually along creek or river banks rarely on steep hillsides or exposed rock outcrops. Soils are recorded as sandy associated with sandstone or rhyolite substrates.

***Phenology*:** Flowers have been recorded throughout the year, particularly in September and October, fruits in February, April, July and from September to November.

***Affinities*:** *Bertya pomaderroides* seems most closely related to *B. brownii* but differs from that by having a glabrous adaxial leaf lamina surface, generally smaller and thicker leaves, a finer indumentum on the branchlets and abaxial leaf lamina surface, the presence of a single size class of hair in the abaxial leaf lamina surface, and a glabrous or sparsely stellate-pubescent ovary.

***Typification*:** In the protologue of *Bertya pomaderroides*, Mueller (1863) cited a collection from Bent's Basin near Port Jackson collected by W. Woolls. Six sheets (four at MEL and one each at NSW and K) from the same locality with the same collector and labelled *B. pomaderroides* have been located. They all appear to be part of the original material used by Mueller to describe this species. The MEL sheet [MEL114101] is here selected as lectotype because it matches the description in the protologue and is annotated by Mueller.

***Notes*:** The collections *Constable* [NSW55744], *Mills* [NSW194898] and *Pearce* [NSW194897] (all in NSW) and *Bauerlen* [CANB383025] (CANB) have slightly larger leaves and a coarser indumentum than is typical for *B. pomaderroides*. Study of more material in the field is required to ascertain the significance of this variability.

22. Bertya recurvata Halford & R.J.F.Hend. **sp. nov.** arte affinis *B. gummiferae* Planch. ut videtur sed caulibus pilorum stellatorum indumento caduco non persistenti, foliis lamina adaxialiter

subtiliter non grosse tuberculata, et floribus femineis calycis lobis marginibus integris non ciliatis differt. In additamentis haec species affinis *B. pinifoliae* Planch. et *B. graniticae* Halford & R.J.F.Hend. Ab illa foliis lamina rotundata non glande apiculata ad apicem, latiore et proportione breviore (l/w ratio minus quam 20:1 non plus quam 30:1), et floribus femineis calycis lobis leviter magnioribus (4.7–5.1 mm non 2.9–3.6 mm longis) differt. Ab haec foliis lamina distaliter recurvata non stricta et floribus femineis calycis lobis marginibus integris non ciliatis differt. **Typus:** Queensland. DARLING DOWNS DISTRICT: Portion 90, Wyberba, 5 September 1993, *P.I. Forster & A.R. Bean* PIF13846 (holo: BRI; iso: AD, NSW, MEL, CANB, distribuendi).

Bertya sp. (Amiens L.Pedley 1488), Forster & Halford (2002, p. 69).

Monoecious or dioecious, much branched shrubs up to 1.5 m high, thinly viscid on most parts. Branchlets ± angular, becoming terete with age, glabrous or rarely sparsely stellate-pubescent on young shoots, soon becoming glabrous, finely tuberculate; hairs stipitate with stipes up to 0.1 mm long, white, 0.4–0.5 mm across. Leaves petiolate, spirally alternate, ascending to spreading; petiole ± bi-convex, 1–1.5 mm long, glabrous, smooth or sparsely tuberculate; lamina linear to lorate, 15–27 mm long, 1.5–2.6 mm wide, recurved at tip; adaxial surface green, glabrous, finely tuberculate; abaxial surface white, densely hairy with sessile and shortly stipitate stellate (0.3–0.6 mm across) and simple glandular (up to 0.05 mm long) hairs; margin recurved or revolute to midrib concealing abaxial leaf lamina surface; apex rounded; base cuneate; midvein faintly impressed or obscure adaxially, abaxially raised and angular, glabrous or with scattered stellate hairs on abaxial face, becoming glabrous, tuberculate, stellate-pubescent laterally; marginal glands present at base of lamina, 1 each side of midrib, 0.25–0.35 mm across, sessile. Inflorescences of a single flower or rarely umbelliform with 2 flowers, pedunculate, axillary or sometimes terminal on rudimentary, short branchlet in distal leaf axils; peduncles up to 1 mm long; bracts 3–8, persistent; outer bracts narrowly ovate or narrowly triangular, 2.7–3.5 mm long, 1–2.6 mm wide, obtuse to rounded at apex, glabrous, papillose; inner bracts narrowly ovate to broadly ovate, 2.4–2.9 mm long, 1.4–2.2 mm wide, obtuse, rounded or acuminate, glabrous. Male flowers sessile; calyx lobes 5, yellow-green coloured, oblong-elliptic, 4–5.3 mm long, 3.3–4.2 mm wide, rounded at tip, glabrous; androecium 5.5–7.0 mm long, 0.9–1.4 mm across; stamens 40–80; filaments 0.1–0.2 mm long; anthers 0.9–1.4 mm long. Female flowers sessile; calyx 5-lobed, yellow-green coloured; tube 0.5–0.7 mm long; lobes equal, ± erect and incurved distally, elliptic to oblong-elliptic or ovate, 4.7–5.1 mm long in flower, up to 11 mm long in fruit, 2.7–3.5 mm wide, rounded at tip, glabrous, with margins entire; petals absent or rudimentary when ovate, up to 0.8 mm long and 0.4 mm wide, and glabrous; ovary ovoid to subglobose, 1.4–2.4 mm long, 1.4–2.0 mm across, 3-locular, glabrous; style with glabrous column 0.5–0.8 mm long and 3 spreading limbs; limbs red, 4–6 mm long, 0.7–0.8 mm wide, deeply 2– to 4-lobed; lobes 3.0–4.5 mm long, 0.4–0.5 mm wide. Capsule ellipsoid, 7.5–8.2 mm long, 3.5–5.1 mm across, glabrous, usually 1– or 2-seeded; persistent calyx lobes usually longer than capsule. Seed obloid-ellipsoid, 5.0–5.8 mm long, 3.0–3.2 mm wide, 2.1–2.8 mm across, dark brown to dark reddish brown; caruncle pyramidal, 1.7–2.0 mm across, 1.3–1.6 mm long, creamy-white. Fig. 8.

***Selected specimens (from 19 examined)*: Queensland.** DARLING DOWNS DISTRICT: Wallangarra, Jan 1906, *Boorman* (NSW); Wallangarra, Jul 1904, *Boorman* (NSW); Girraween National Park, 15 km N of Wallangarra, Nov 1975, *Clifford* (NSW); Portion 90, Wyberba, Aug 1995, *Forster & Figg* PIF17595 (BRI); Bald Rock Creek, 2.5 km W of Girraween National Park Headquarters, Sep 1993, *Forster & Bean* PIF13843 (BRI); Girraween National Park, Bald Rock Creek area, Jan 1993, *Forster & Halford* PIF12640 (BRI); c. 5 miles [8 km] W of Wyberba near Girraween National Park, Oct 1975, *Hassall* 7579 (BRI); 8 km W of Wyberba, near Girraween National Park, Sep 1976, *Hassall* 7666 (BRI); near Girraween National Park, Apr 1975, *Hassall* 754 (BRI); Wyberba, in 1961, *Hockings* (BRI); Amiens, 10 miles [c. 16 km] NW of Stanthorpe, Oct 1963, *Pedley* 1488 (BRI, K); Girraween National Park near Wyberba, Sep 1970, *Ryan* 50 (BRI); on property of W. McDongah, Lyra, Oct 1962, *Shea* S122 (BRI); Bald Rock Creek, 10 km N of Wallangarra, Sep 1973, *Telford & Zander* 3195 (CANB); Bald Rock Creek, 10 km N of Wallangarra, Sep 1973, *Telford* 3194 (CANB).

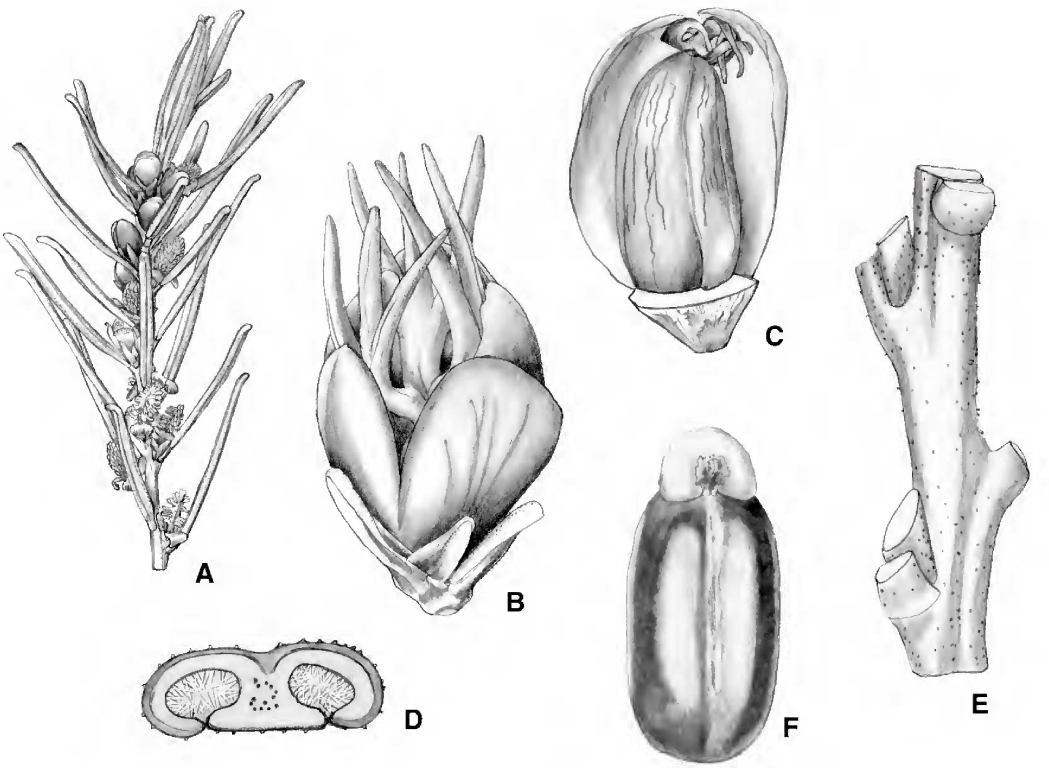

Fig. 8. ***Bertya recurvata.*** A. branchlet with male flowers. ×1. B. female flower from side. ×6. C. fruit from side with frontal enlarged persistent calyx lobes removed. ×4. D. transverse section of leaf. ×16. E. section of branchlet. ×6. F. ventral view of seed. ×6. A from *McDonald* s.n. 11 Sep 1990 (BRI); B, D & E from *Forster & Bean* PIF13846 (BRI); C & F from *Forster & Halford* PIF12640 (BRI). Del. W. Smith.

***Distribution and habitat*:** *Bertya recurvata* is confined to the south-east of Queensland where it is restricted to the Stanthorpe-Wallangarra area (Map 26). It is recorded as growing on shallow sandy soils on exposed granite outcrops in heath, dense shrubland, open *Callitris* woodland or open eucalypt forest or woodland communities.

***Phenology*:** Flowers have been recorded from July to October, fruits in January, April, October and November.

***Affinities*:** *Bertya recurvata* seems most closely allied to *B. gummifera* but differs from that by lacking a persistent indumentum of stellate hairs on the stems, finely tuberculate rather than coarsely tuberculate adaxial leaf lamina surfaces and entire rather than ciliate margins of the calyx lobes of female flowers.

B. recurvata is also similar to *B. pinifolia* and *B. granitica* but differs from the former in its leaves not being ultimately terminated by an apiculate gland, wider and proportionally shorter leaf laminas (leaf lamina length/width ratio less than 20:1 compared with greater than 30:1), and slightly larger calyx lobes in female flowers (4–7–5.1 mm long compared with 2.9–3.6 mm long). For differences from *B. granitica* refer to notes under that species.

***Etymology*:** The specific epithet is derived from Latin *recurvatus*, curved backwards, in reference to the recurved apex of the leaves of this species.

23. Bertya riparia Halford & R.J.F.Hend. **sp. nov.** arte affinis *B. tasmanicae* subsp. *vestitae* Halford & R.J.F.Hend. ut videtur sed foliis lamina latiore (2.4–4.4 mm non 0.9–2.1 mm lata) marginibus strictis non

recurvis ad costam, et inflorescentiis pedunculo longiore (1.5–2.5 mm non 0.7–1.4 mm longo) differt. **Typus:** New South Wales. 5 km SE of Macks Crossing along Stokes Hut Trail, Kosciusko National Park, 29 October 1993, *N. Taws* 216 & *A. Scott* (holo: BRI; iso: CANB, MEL, NSW).

Monoecious, much branched shrubs 1–2 m high. Branchlets terete, with a dense indumentum of stellate hairs; hairs sessile or stipitate on stipes up to 0.1 mm long, golden-yellow or grey-white, up to 0.6(1.0) mm across. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 1.5–3 mm long, with a moderately dense, stellate hairy indumentum up to 0.1 mm thick; lamina narrowly obovate or linear, 21–29 mm long, 2.4–4.4 mm wide; adaxial surface green, with a sparse to moderately dense indumentum of stellate hairs, glabrescent, smooth or with scattered tubercules (persistent hair bases); abaxial surface white, densely hairy with stipitate stellate hairs 0.4–0.5 mm across; margin recurved; apex rounded to obtuse; base cuneate; midvein impressed adaxially, abaxially raised and ± rounded, densely stellate-pubescent; marginal glands present at base of lamina, 1 each side of midrib, c. 0.1 mm across, sessile. Inflorescences of a single flower or umbelliform with 2 flowers, pedunculate, axillary; peduncles 1.5–2.5 mm long; bracts 5–8, persistent; outer bracts triangular, 2.9–3.2 mm long, 1.7–2.2 mm wide, acute to acuminate at tip, stellate-pubescent abaxially, glabrous or stellate-pubescent distally adaxially; inner bracts narrowly ovate to ovate, 3.5–4.0 mm long, 1.3–1.5 mm wide, acute at tip, glabrous except for stellate hairs distally abaxially. Male flowers sessile; calyx lobes 5, of unknown colour when fresh, elliptic, 3-4 mm long, 2–2.5 mm wide, rounded at tip, glabrous adaxially, stellate-pubescent abaxially; androecium c. 2 mm long, 0.5–0.6 mm across; stamens c. 30; filaments 0.1–0.2 mm long; anthers 0.7–0.8 mm long. Female flowers sessile; calyx 5-lobed, of unknown colour when fresh; tube 0.8–0.9 mm long; lobes ± equal or inner lobes slightly narrower, erect, spreading to recurved distally, narrowly ovate to ovate, 3.2–4.2 mm long, 1.4–2.1 mm wide, acute at tip, glabrous adaxially sparsely stellate-pubescent abaxially, with margins fimbriate; petals absent; ovary ovoid, 1.8–2.2 mm long, 1.5–2 mm across, 3-locular, densely stellate-pubescent; style with hairy column 0.1–0.3 mm long and 3 spreading limbs; limbs red, 1.6–3.1 mm long, c. 0.3 mm wide, deeply 3– or 4-lobed; lobes 1.5–2.3 mm long, 0.1–0.2 mm wide. Mature capsule and seed not seen. Fig. 9 & 10.

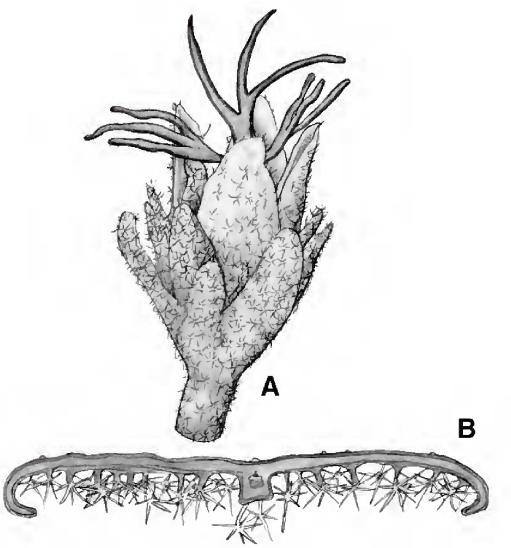

Fig. 9. ***Bertya riparia***. A. female flowers from the side. ×6. B. transverse section of leaf. ×12. A & B from *Taws* 216 & *Scott* (BRI). Del. W. Smith.

***Additional specimens*: New South Wales.** Brindabella, 1 km along track following Goodradigbee River downstream, Feb 1984, *James & Taylor* 537 (NSW); Crown Reserve 13 km directly ESE of Tumut, S bank of Goobarragandra River, Jan 1994, *Taws* 372 & *Scott* (BRI, CANB, NSW); c. 16.5 km directly ESE of Tumut, beside Goobarragandra River, 50 m downstream from suspension bridge, Dec 1993, *Taws* 298 (BRI, CANB); junction of Flea Creek and Goodradigbee River, downstream from Brindabella, Sep 1973, *Whaite* 3538 (CANB, NSW).

***Distribution and habitat*:** *Bertya riparia* is confined to the Southern Tablelands of New South Wales where it occurs from near Tumut eastward to Brindabella (Map 27). It is recorded from riparian habitats in open forest or woodland communities on grey sandy, dark brown sandy clay or dark brown loam soils where it is associated with *Leptospermum* spp. *Callistemon sieberi* DC., *Pomaderris angustifolia* Wakef., *Bursaria spinosa* Cav.,

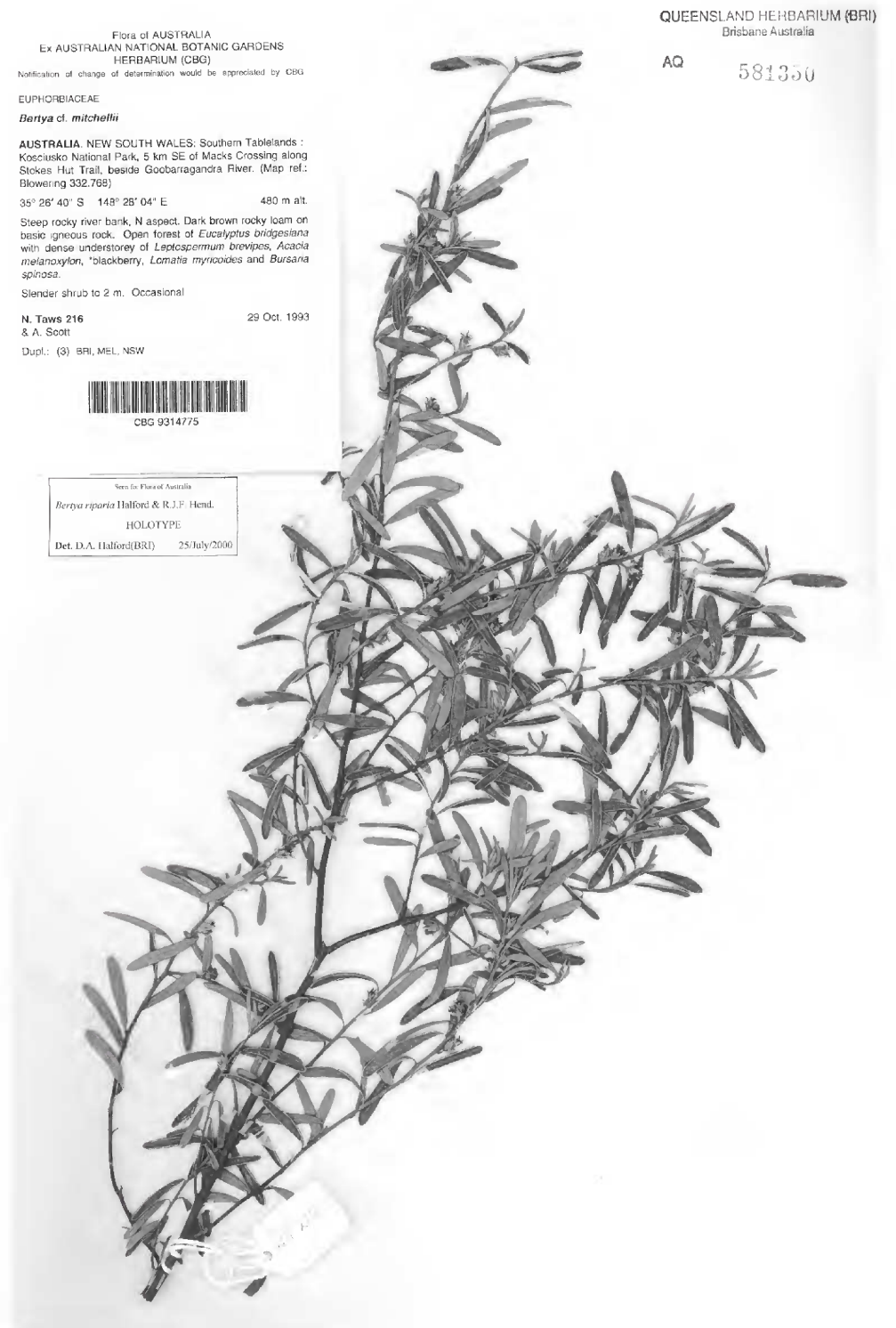

Fig. 10. Holotype of ***Bertya riparia***.

Acacia spp., *Lomandra longifolia* Labill. and/or *Rubus* spp.

***Phenology*:** Flowers have been recorded in February, September and October, mature fruits have apparently not been collected.

***Affinities*:** *Bertya riparia* seems most closely related to *B. tasmanica* subsp. *vestita* but differs from that by its wider leaves (2.4–4.4 mm wide compared with 0.9–2.1 mm wide) with margins not recurved to midrib and slightly longer peduncles (1.5–2.5 mm long compared with 0.7–1.4 mm long).

***Etymology*:** The specific epithet is from Latin *riparius*, meaning frequenting banks of streams or rivers, in reference to the habitat in which this species grows.

24. Bertya rosmarinifolia Planch., London J. Bot. 4: 473, t. 16, fig. 2-5 (1845). **Type:** [New South Wales.] Channel of Cox's River, [October 1822,] [*A. Cunningham*] (lecto, here chosen: K (ex herb. Hook.); isolecto: K (ex herb. Benth.)).

Croton rosmarinifolius A.Cunn. in B. Fields, Geographical Memoirs on New South Wales. 355 (1825), *nom. illeg.*, non Salisb., Prod. 389 (1796). **Type:** [New South Wales.] Channel of Cox's River, [October 1822,] [*A. Cunningham*] (lecto, here chosen: K (ex herb. Hook.); isolecto: K (ex herb. Benth.)).

Bertya polymorpha forma *rosmarinifolia* Baill., Adansonia 6: 300 (1866). **Type:** [New South Wales.] Channel of Cox's River, [October 1822,] [*A. Cunningham*] (lecto, here chosen: K (ex herb. Hook.); isolecto: K (ex herb. Benth.)).

Monoecious or dioecious, much branched shrubs up to 2 m high, viscid on buds, flowers and sometimes on young leaves. Branchlets ± angular, becoming terete with age, with a dense indumentum of stellate hairs, becoming glabrous with age; hairs ± sessile, white to grey-white, 0.1–0.5 mm across. Leaves petiolate, spirally alternate or subopposite, ascending; petiole plano-convex, 0.8–1.8 mm long, glabrous adaxially, with a dense stellate-pubescent indumentum up to 0.1 mm thick abaxially; lamina lorate to linear, 7–25 mm long, 0.8–1.6 mm wide, slightly recurved at tip; adaxial surface dark green, with scattered stellate hairs, glabrescent, smooth or sparsely punctate; abaxial surface white, densely hairy with sessile stellate hairs 0.2–0.4 mm across; margin recurved to midrib concealing abaxial surface; apex rounded to truncate or retuse, usually ultimately terminated by a sessile gland; base obtuse to cuneate; midvein slightly impressed or raised adaxially, abaxially raised and angular, stellate-pubescent; marginal glands present at base of lamina, 1 or 2 each side of midrib, c. 0.1 mm across, sessile. Inflorescences of a single flower, pedunculate, axillary; peduncles 0.9–2.5 mm long; bracts 6–8, persistent; outer bracts ovate or oblong, 0.6–1.7 mm long, 0.4–0.7 mm wide, rounded to obtuse at tip, glabrous adaxially, stellate-pubescent abaxially; inner bracts, ovate to narrowly ovate, 0.9–1.1 mm long, 0.4–0.6 mm wide, acute at tip, glabrous or with scattered stellate hairs abaxially. Male flowers sessile; calyx lobes 5, light green or yellow-green with a reddish coloured blush distally, ovate-elliptic or oblong-elliptic, 2.7–3.5 mm long, 1.5–2.5 mm wide, rounded at tip, glabrous; androecium 2.8–3.5 mm long, 0.4–0.5 mm across; stamens 16–25; filaments up to 0.1 mm long; anthers 0.7–1 mm long. Female flowers sessile; calyx 5-lobed, light green tinged red to maroon coloured distally; tube 0.5–0.9 mm long; lobes ± equal, erect, recurved to revolute distally, ovate to oblong-ovate, 2.1–3.5 mm long, 0.8–1.4 mm wide, acute to obtuse at tip, glabrous, with margins entire; petals absent or rudimentary when narrowly ovate or narrowly obovate, up to 1.2 mm long and 0.3 mm wide, glabrous; ovary ellipsoid, 1.3–1.6 mm long, 1.2–1.5 mm across, 3-locular, stellate-pubescent; style with hairy column 0.2–0.3 mm long and 3 spreading limbs; limbs red, 1.7–2.8 mm long, c. 0.4 mm wide, deeply 2– or 3(rarely 4)-lobed; lobes 1.0–2.5 mm long; 0.1–0.2 mm wide. Capsule ovoid to ovoid-ellipsoid, 4.5–6.2 mm long, 2.7–3.1 mm across, ± glabrous or sparsely stellate-pubescent, usually 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid, 3.2–3.5 mm long, 2.8–2.9 mm wide, 1.5–1.7 mm across, light brown; caruncle pyramidal, c. 0.7 mm across, c. 0.5 mm long, creamy-white.

***Selected specimens (from 60 examined)*: Queensland.** DARLING DOWNS DISTRICT: Stanthorpe, Jul 1904, *Boorman* (NSW); Stanforth [Stanthorpe], Nov 1943, *Clemens* (BRI); Stanthorpe, Quart Pot Creek, *Halford* Q3834 (BRI). **New South Wales.** Shoalhaven River, 200 m downstream from Warri Bridge, Sep 1989, *Butler* 1612 (CANB); Mt McDonald, near Lachlan River, Aug 1900, *Cambage* (NSW); Walcha, Oct 1899, *Campbell* (AD, BRI, NSW); Shoalhaven River, 9 miles [c. 14 km] NW of Braidwood, Nov 1970, *Common & Dugdale* (CANB); WNW of Glen Innes via Wellingrove in the Kings Plains National Park, Feb 1994, *Coveny & Whalen* 16624 (BRI, NSW); Apsley Falls, Oxley Wild Rivers National Park, c. 19 km WSW of Walcha, Sep 1990, *Henderson & Turpin* H3408 (BRI); *ditto*, Sep 1990, *Henderson & Turpin* H3407 (BRI); head of Apsley Falls, Oct 1953, *Johnson* (NSW); Inverell, Aug 1905, *Maiden & Boorman* (NSW); Cox's River, Oct 1904, *Maiden & Cambage* (NSW); Tallowa Dam, Shoalhaven River, Oct 1985, *Mills* (NSW); 10 miles [c. 16 km] from Braidwood towards Goulburn, Sep 1972, *Salasoo* 5055 (NSW); Dangar's Falls, 20 km SSE of Armidale, Sep 1988, *Telford* 10712 (BRI, CANB, MEL); Stony Creek Falls, E of Walcha, Oct 1966, *Wissmann* (NE). **Australian Capital Territory.** Queanbeyan River E of Wickerslack Lane, Apr 1997, *Crawford* 4312 (CANB, NSW); Molonglo River near Oaks Estate, below River Street, Nov 1989, *Hadobas & Matthews* 106 (CANB, NSW).

***Distribution and habitat*:** *Bertya rosmarinifolia* occurs in eastern Australia from Stanthorpe, Queensland, southwards to Kameruka in southern New South Wales (Map 28). It is recorded from shrubland communities on rocky river banks or rarely on rocky mountain ridges. Soils are recorded as shallow mostly alluvial sand or loam.

***Phenology*:** Flowers have been recorded from July to October, with one record in February, fruits from October to December.

***Affinities*:** *Bertya rosmarinifolia* is superficially similar to *B. tasmanica* but can be distinguished from that by its generally narrower, linear to linear-oblong leaf laminas and its truncate to rounded leaf apex.

***Typification*:** In the protologue of *Bertya rosmarinifolia*, Planchon (1845) cited two syntypes 'Juxta amnem, Cox' and 'in montibus coeruleis' both collected by A. Cunningham. At the time Planchon was an assistant to W.J. Hooker at Kew. In the material on loan to BRI from K we have located two specimens collected by Alan Cunningham on two separate sheets that are both stamped as originating from Hooker's herbarium. Although neither sheet is clearly annotated by Planchon with the name *B. rosmarinifolia*, both are considered to be part of the original material used by Planchon when describing the species. One specimen has a field label attached to the specimen stating '*Croton rosmarinifolia* C, handsome shrub to 8 feet high, Channel of Cox's River', while the other has the following information written on the sheet beside the specimen: 'Blue Mount, Nov. Holl., *B. rosmarinifolia* Müll.Arg.!, *B rosmarinifolia* Planch.'.

We have chosen to lectotypify the name *B. rosmarinifolia* Planch. by the specimen originating from Hooker's herbarium labelled 'Channel of Cox's River'. A third specimen at K, on a sheet stamped as originating from Bentham's herbarium, appears to be a duplicate of the specimen from Hooker's herbarium here chosen as lectotype for Planchon's name though it bears Cunningham's collecting number 64 whereas the others are without a collecting number.

Cunningham's *Croton rosmarinifolius* is illegitimate being a later homonym of Salisbury's *Croton rosmarinifolius* of 1796, a name which applies to a different species from the West Indies.

25. Bertya rotundifolia F.Muell., Fragm. 4: 34 (1863). **Type:** [South Australia.] Cygnet River, Kangaroo Island, [without date,] *F. Waterhouse* (holo: MEL [MEL114120]; iso: K).

Illustration: J.Z. Weber (1986: p. 740, fig. 397B).

Monoecious or sometimes dioecious, much branched shrubs up to 2 m high. Branchlets ± terete, with a dense indumentum of stellate hairs, becoming glabrous with age; hairs sessile or stipitate with stipes up to 1.5 mm long, white, 0.2–0.7 mm across. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 1.4–2.5 mm long, glabrous and smooth above, with a dense stellate-pubescent indumentum up to 0.4 mm thick below; lamina ovate or orbicular, 5–10 mm long, 3–8 mm wide; adaxial surface green, sparsely hairy with stipitate stellate hairs 0.3–0.7 mm across, glabrescent, tuberculate with persistent hair bases; abaxial surface white, densely hairy with sessile and stipitate hairs 0.2–0.5 mm across;

margin recurved; apex obtuse to rounded; base obtuse or sometimes slightly cordate; midvein obscure or slightly impressed adaxially, abaxially raised; marginal glands usually present at base of lamina, 1 each side of midrib, c. 0.1 mm long, ± sessile. Inflorescences of a single flower, pedunculate, axillary; peduncles 0.5–0.8 mm long; bracts 4–8, persistent; outer bracts ovate, 1.1–2 mm long, 0.7–1.5 mm wide, obtuse to rounded at tip, stellate-pubescent abaxially; inner bracts ovate to broadly ovate, 0.9–1.1 mm long, 0.5–1.1 mm wide, obtuse at tip, glabrous or with scattered stellate hairs abaxially. Male flowers sessile; calyx lobes 5, brown, ovate or ovate-elliptic, 1.5–3 mm long, 1.3–2.2 mm wide, obtuse to rounded at tip, glabrous; androecium 1.9–3.0 mm long, 0.4–0.5 mm across; stamens 18–25; filaments c. 0.1 mm long; anthers 0.6–0.8 mm long. Female flowers subsessile; calyx 5-lobed, yellow-green coloured; tube 0.5–0.7 mm long; lobes equal, erect, recurved distally, narrowly ovate to ovate, 1.5–2.2 mm long, 0.7–1.5 mm wide, acute or obtuse at tip, glabrous or with a sparse indumentum of stellate hairs abaxially, glabrous adaxially, with margins entire; petals absent; ovary subglobose, c. 1.5 mm long, c. 1.5 mm across, 3-locular, stellate-pubescent; style with glabrous column 0.3–0.5 mm long and 3 spreading limbs; limbs red, 1.6–2.2 mm long, c. 0.2 mm wide, deeply 2– or 3-lobed; lobes 1.2–1.6 mm long, c. 0.1 mm wide. Capsule ovoid to ellipsoid, 6–7 mm long, 3.5–4 mm across, with a moderately dense indumentum of stellate hairs, glabrescent, 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid or ellipsoid, 4.3–5.5 mm long, 2.5–3.8 mm wide, 2.2–3.3 mm across, light brown and mottled with grey, dark brown and black; caruncle pyramidal, 1.0–2.1 mm across, 1.2–1.5 mm long, yellowish-white. Kangaroo Island Bertya.

***Selected specimens (from 68 examined)*: South Australia.** Muston, Kangaroo Island, Aug 1943, *Cooper* (AD); Kingscote-Penneshaw road, c. 11 km WSW of American River, Dec 1989, *Davies* 1491 (CANB, MEL, NSW); c. 13 km S of Kingscote, Nov 1958, *Eichler* 15263 (AD); Cygnet River Bridge on Amen Corner to Kohinoor Road, c. 2 km NW of junction with Playford Highway, Aug 1982, *Jackson* 4529 (AD); c. 3 km along 3-Chain Road from Kingscote-Penneshaw road, Sep 1994, *Jones & Jones* 13280 (CANB); Kangaroo Island, 1 km N of Flour Cask Bay, Jun 1986, *Kraehenbuehl* (MEL); Hundred of Haines, Kangaroo Island, Jun 1989, *Lang* 8497 (BRI); near American River, Kangaroo Island, Nov 1973, *Nelson* ANU17289 (AD, CANB); near Destree Bay, Kangaroo Island, Aug 1964, *Phillips* (CANB); Stoke's Bay Road, Kangaroo Island, Oct 1976, *Spooner* 4782 (AD); near Birchmore Lagoon, 21 km SW of Kingscote, Nov 1958, *Wilson* 892 (AD).

***Distribution and habitat*:** *Bertya rotundifolia* is confined to South Australia where it is restricted to Kangaroo Island (Map 29). It is recorded as growing in coastal shrubland or open woodland communities on sandy soils.

***Phenology*:** Flowers have been recorded in February, from May to October and in December, fruits from August to December.

26. Bertya sharpeana Guymer, Austrobaileya 2(5): 427 (1988). **Type:** Queensland. Moreton District: Mt Coolum, 14 August 1982, *G.P. Guymer* 1771 (holo: BRI; iso: AD *n.v.*, BRI, CANB, K *n.v.*, MEL *n.v.*, NSW, PERTH *n.v.*, *fide* Guymer, *loc. cit.*).

Illustration: G.P. Guymer (1988: p. 428, fig. 1).

Monoecious or dioecious, much branched shrubs up to 4 m high. Branchlets terete, with a dense indumentum of stellate hairs, becoming glabrous with age though remaining tuberculate by persistent hair bases; hairs stipitate with stipes 0.1–0.8 mm long, white, 0.7–1.3 mm across. Leaves petiolate, spirally alternate, spreading; petiole plano-convex, 1–4 mm long, slightly grooved adaxially, with a dense stellate-pubescent indumentum up to 2.5 mm thick; lamina narrowly ovate to ovate, 8–22 mm long, 3–10 mm wide; adaxial surface green, sparsely hairy with stipitate stellate hairs 0.3–1.0 mm across, glabrescent, tuberculate with persistent hair bases; abaxial surface white, densely hairy with stipitate stellate hairs 0.3–0.7 mm across; margin recurved or flat; apex obtuse to acute; base obtuse or slightly cordate; midvein slightly impressed adaxially, abaxially raised and angular or rounded, stellate-pubescent; marginal glands usually present at base of lamina, 1 each side of midrib, c. 0.1 mm across, stipitate with stipes 0.2–0.7 mm long. Inflorescences of a single flower, pedunculate, axillary; peduncles 0.5–0.7 mm long; bracts 5–9, persistent; outer bracts narrowly ovate to broadly ovate, 1.2–1.6 mm

long, 0.7–1.7 mm wide, acute or acuminate at tip, glabrous or stellate-pubescent distally adaxially, stellate-pubescent abaxially; inner bracts broadly ovate to orbicular, 1.1–1.6 mm long, 1.3–1.7 mm wide, obtuse to rounded at tip, glabrous or stellate-pubescent distally abaxially. Male flowers sessile; calyx lobes 5, white with a pinkish-coloured blush, turning reddish-pink with age, elliptic to oblong-elliptic, 2.5–4 mm long, 1.5–2 mm wide, rounded at tip, glabrous; androecium 3.0–4.0 mm long, 0.4–0.5 mm across; stamens 47–53; filaments c. 0.1 mm long; anthers 0.4–1 mm long. Female flowers sessile; calyx 5-lobed, light green coloured; tube 0.3–0.4 mm long; lobes equal, erect, recurved distally, ovate to oblong-ovate, 1.0–2.7 mm long, 0.8–1.8 mm wide, rounded to obtuse at tip, glabrous, with margins mostly fimbriate; petals absent or rudimentary when ovate or obovate, up to 0.8 mm long and 0.4 mm wide, glabrous; ovary globose, 0.8–0.9 mm long, 0.8–0.9 mm across, 3-locular, sparsely to densely stellate-pubescent; style with hairy column c. 0.1 mm long and 3 spreading limbs; limbs red to maroon, 1.1–4.5 mm long, deeply 2– to 4-lobed; lobes 0.6–3.5 mm long, 0.1–0.4 mm wide. Capsule narrowly ellipsoid or narrowly ovoid, 4–8 mm long, 2.4–3.5 mm across, sparsely stellate-pubescent, 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid-ellipsoid, 3.1–4.5 mm long, 2.0–2.9 mm wide, 2.3–2.7 mm across, light brown and mottled with dark brown; caruncle pyramidal, c. 1.8 mm across, c. 1.1 mm long, creamy-white.

***Selected specimens (from19 examined)*: Queensland.** North Kennedy District: Roma Peak, c. 40 km S of Bowen, Jun 1991, *Bean* 3365 (BRI, CANB); *ditto*, Jun 1991, *Bean* 3360 (BRI, NSW). South Kennedy District: Dick's Tableland, Eungella National Park, Aug 1990, *Pearson* 364 (BRI). Leichhardt District: Diamond Cliffs, Sydney Heads, W of Mackay, Feb 1990, *Pearson* E205 (BRI). Moreton District: Mt Coolum, Sep 1989, *Batianoff* 890905 (BRI, NSW); *ditto*, Aug 1982, *Guymer & Sharpe* 1768 (BRI, NSW); *ditto*, Jul 1982, *Sharpe* 3213 (BRI, NSW); *ditto*, Sep 1981, *Sharpe & Batianoff* 2992 (BRI, NSW); *ditto*, Nov 1981, *Sharpe* 3049 (BRI, NSW).

***Distribution and habitat*:** *Bertya sharpeana* has a disjunct distribution in central and south-eastern Queensland from near Bowen, Mackay and Nambour (Map 30). It is recorded as growing on rhyolitic outcrops mostly in heath but occasionally in open forest or woodland communities or on rainforest margins. Soils are recorded as skeletal dark brown organic loams.

***Phenology*:** Flowers have been recorded from June to September and in November, fruits in August, September and November.

***Notes*:** The northern populations of *B. sharpeana* tend to have slightly longer and broader leaf laminas and larger female flowers than those from the type locality at Mt Coolum, south-east Queensland.

27. Bertya tasmanica (Sond. & F.Muell.) Müll.Arg., Linnaea 34: 63 (1865); *Ricinocarpos tasmanicus* Sond. & F.Muell., Linnaea 28: 562 (1857). **Type:** Tasmania, [without date,] *C. Stuart* (holo: MEL (ex herb. Sonder) [MEL2065834]; iso: G-DC *n.v.*, microfiche IDC 800-73. 2456: I. 6).

Monoecious or sometimes apparently dioecious, much branched shrubs up to 2.5 m high, sometimes thinly viscid on buds and flowers. Branchlets ± angular, becoming terete with age, with a dense indumentum of stellate hairs, becoming glabrous with age; hairs ± sessile or stipitate with stipes up to 0.1 mm long, white to grey-white or golden brown, 0.1–0.3(0.6) mm across. Leaves petiolate, spirally alternate, ascending to spreading; petiole ± bi-convex or plano-convex, 1.0–3.1 mm long, with a dense stellate-pubescent indumentum up to 0.1 mm thick on both surfaces or glabrous adaxially; lamina lorate to linear, 8–32 mm long, 1.2–1.6 mm wide; adaxial surface green to grey-green, with a sparse to moderately dense indumentum of stellate hairs up to 0.4 mm across, glabrescent, smooth, sparsely punctate or minutely tuberculate with persistent hair bases; abaxial surface white, densely hairy with sessile or shortly stipitate stellate hairs 0.1–0.5 mm across; margin recurved or revolute to midrib concealing abaxial surface; apex obtuse to acute, rarely apiculate with extension from mibrib up to 0.5 mm long; base cuneate or obtuse; midvein obscure, raised or slightly impressed adaxially, abaxially raised and angular to rounded, stellate-pubescent; marginal glands present at base of lamina, 1

each side of midrib, c. 0.1 mm across, sessile or stipitate with stipes up to 0.1 mm long. Inflorescences of a single flower or rarely umbelliform with 2 flowers, pedunculate, axillary; peduncles 0.7–2.0 mm long; bracts 5–9, persistent; outer bracts ovate to narrowly ovate or oblong, 1.4–3.4 mm long, 0.6–1.7 mm wide, densely stellate-pubescent on both surfaces or glabrous adaxially; inner bracts ovate to broadly ovate, orbicular or lanceolate, 1.2–2.4 mm long, 0.7–1.7 mm wide, glabrous except for stellate hairs on midline of abaxial surface. Male flowers ± sessile; calyx lobes 5, yellowish coloured with a reddish blush distally, ovate, elliptic or oblong-elliptic, 2.4–5.1 mm long, 2.0–3.2 mm wide, rounded at tip, glabrous or with scattered stellate hairs on margin or along midline adaxially; androecium 1.6–3.0 mm long, 0.3–0.9 mm across; stamens 15–55; filaments 0.1–0.2 mm long; anthers 1.0–1.3 mm long. Female flowers ± sessile; calyx 5-lobed, light green but tinged red to maroon distally; tube 0.5–0.8 mm long; lobes ± equal, erect, recurved or revolute distally, narrowly ovate to ovate or narrowly triangular, 1.8–4.3 mm long in flower, up to 6 mm long in fruit, 0.7–1.9 mm wide, acute or rarely rounded at tip, glabrous or sparsely to densely stellate-pubescent abaxially, with margins entire or fimbriate; petals absent or rudimentary when up to 0.2 mm long and 0.1 mm wide, glabrous; ovary ellipsoid, 1.3–2.2 mm long, 1.1–1.7 mm across, 3(rarely 4)-locular, densely stellate-pubescent to tomentose, rarely glabrous; style with hairy column 0.1–0.6 mm long and 3(rarely 4) spreading limbs; limbs maroon or pale yellow, 1.6–2.9 mm long, 0.3–0.4 mm wide, deeply 2- to 4-lobed; lobes 1.0–2.3 mm long, 0.1–0.2 mm wide. Capsule ellipsoid or narrowly ovoid, 5.6–8.0 mm long, 3.1–4.1 mm across, with a sparse to dense indumentum of stellate hairs or rarely glabrous, 1-seeded; persistent calyx lobes ≤ half the capsule length. Seed obloid, 3.9–5.2 mm long, 2.0–3.4 mm wide, 1.8–3.1 mm across, light brown; caruncle pyramidal, 1.1–1.5 mm across, 0.6–0.9 mm long, yellowish-white.

***Distribution*:** *Bertya tasmanica* is widespread in south-east Australia from near Kimba, South Australia eastwards to Coonabarabran and the Southern Tablelands, New South Wales, southward to the east coast of Tasmania.

***Notes*:** As circumscribed here *Bertya tasmanica* includes the taxon that has previously been known by the misapplied name *B. mitchellii*.

Two geographically disjunct taxa are recognizable within *B. tasmanica* as accepted here. These taxa are here recognized as subspecies which can be distinguished using the following key.

Calyx lobes of female flowers glabrous ..... **27a. B. tasmanica** subsp. **tasmanica**
Calyx lobes of female flowers sparsely to densely stellate-pubescent
..... **27b. B. tasmanica** subsp. **vestita**

27a. Bertya tasmanica (Sond. & F.Muell.) Müll.Arg. subsp. **tasmanica**

Monoecious or sometimes dioecious shrubs, usually thinly viscid on buds and flowers. Stellate hairs ± sessile, white to grey-white, 0.1–0.3 mm across. Leaves spreading; petiole glabrous adaxially, with a dense indumentum up to 0.1 mm thick on abaxial surface; lamina with adaxial surface green, sparsely hairy with stellate hairs, glabrescent, smooth or sparsely punctate; apex obtuse to acute, sometimes ultimately terminated by a sessile gland; midvein slightly impressed adaxially. Inflorescences of a single flower, axillary. Male flowers with calyx lobes ovate or elliptic, 2.4–3.3 mm long, 2–2.4 mm wide, glabrous, and stamens c. 27. Female flowers with calyx lobes narrowly ovate to ovate, 1.8–3.6 mm long, acute at tip, glabrous, with margins entire; petals absent or rudimentary when up to 0.2 mm long and 0.1 mm wide; ovary 3-locular, stellate-tomentose; style with 3 spreading limbs; limbs deeply 2– or 3-lobed. Capsule 5.6–6.5 mm long, 3.5–3.7 mm across, with a moderately dense indumentum of stellate hairs. Seed 3.9–4.3 mm long, 2.0–2.2 mm wide, 1.8–2.1 mm across.

***Selected specimens (from 15 examined)*: Tasmania.** Old Coles Bay Road, c. 100 m SE of Apsley River old bridge, Nov 1990, *Buchanan* 11810 (BRI, CANB, MEL, NSW); Apsley River, old bridge on Coles Bay road, Sep 1983, *Crowden* (AD, HO, MEL); Apsley River, c. 1 km up road NE from Tasman Highway Junction - Coles Bay road, Oct 1990, *Henderson & Turpin* H3447 (BRI); *ditto*, Oct 1990 *Henderson & Turpin* H3446 (BRI); road to Coles Bay, Freycinet Peninsula, Nov 1960, *Phillips* (CANB); on banks of Swan and Cygnet Rivers, *Story* (MEL).

***Distribution and habitat*:** *Bertya tasmanica* subsp. *tasmanica* is confined to the east coast of Tasmania where is it restricted to near Bicheno and Cranbrook (Map 31). It is recorded as growing in riparian habitats in heath or woodland communities with a dense shrubby understorey on sandy soils.

***Phenology*:** Flowers have been recorded from September to November, fruits in November.

***Affinities*:** *Bertya tasmanica* subsp. *tasmanica* is similar to *B. rosmarinifolia* with which it shares a similar habitat. It differs from *B. rosmarinifolia* in having obtuse to acute rather than rounded to truncate or retuse leaf laminas which are slightly wider and more attenuate proximally and distally and petioles spreading rather than somewhat appressed to branchlets.

27b. Bertya tasmanica subsp. **vestita** Halford & R.J.F.Hend. **subsp. nov.** ab *B. tasmanica* (Sond. & F.Muell.) Müll.Arg. subsp. *tasmanica* floribus femineis calycis lobis stellato-pubescentibus non glabris differt. **Typus:** Victoria. c. 18 km SSE of Walpeup, on road to Hopetoun, September 1989, *Henderson & Turpin* H3277 (holo: BRI; iso: AD, MEL, according to label information on holotype)

Bertya mitchellii var. *vestita* Grüning in A.Engler, Pflanzenr. H.58: 61 (1913). Type: Victoria, [without date,] *F. Mueller* (syn: *n.v.*); Murray Desert, [without date,] *F. Mueller* (syn: *n.v.*; ?isosyn: MEL (ex herb. Sonder) [MEL2062917], CANB [CANB258548]); Lake Albacutya, [without date,] *C. French* (syn: *n.v.*); Wimmera Distr., [without date,] *F. Mueller* (syn: *n.v.*).

***Illustrations*:** L. Costermans (1986, p. 211) as *Bertya mitchellii*; M.G. Corrick and B.A. Fuhrer (2000, p. 82) as *Bertya mitchellii*.

Monoecious (some plants prominently male or female) shrubs, not viscid. Stellate hairs sessile or stipitate with stipes up to 0.1 mm long, grey-white or rarely golden brown, up to 0.2(0.6) mm across. Leaves ascending to spreading; petiole with a dense indumentum up to 0.1 mm thick on all surfaces; lamina with adaxial surface green to grey-green, with a sparse to moderately dense indumentum of stellate hairs, glabrescent, minutely tuberculate with persistent hair bases; apex acute to obtuse, rarely apiculate by extension from midrib up to 0.5 mm long; midvein obscure, raised or slightly impressed adaxially. Inflorescences of a single flower or rarely umbelliform with 2 flowers, axillary. Male flowers with calyx lobes elliptic to oblong-elliptic, 3.2–5.1 mm long, 1.9–3.2 mm wide, glabrous or with scattered stellate hairs on margin or along midline adaxially, and stamens (15–)30–55. Female flowers with calyx lobes narrowly ovate or narrowly triangular, 2.3–4.3 mm long, acute or rarely rounded at tip, glabrous adaxially, sparsely to densely stellate-pubescent (sometimes glabrous towards margins) abaxially, with margins fimbriate; petals absent; ovary 3(rarely 4)-locular, sparsely to densely stellate-pubescent, rarely glabrous; style 3(rarely 4) spreading limbs; limbs deeply (rarely 2–) 3– or 4-lobed. Capsule 6.4–8 mm long, 3–4.1 mm across, with a sparse to dense indumentum of stellate hairs or rarely glabrous. Seed 4.5–5.2 mm long, 2.5–3.4 mm wide, 2.3–3.1 mm across.

***Distribution and habitat*:** *Bertya tasmanica* subsp. *vestita* occurs from near Kimba, South Australia, eastwards to Swan Hill in north-western Victoria, with disjunct populations in the Coonabarabran area and Southern Tablelands of New South Wales and East Gippsland in Victoria (Map 32). It is recorded mostly as growing on sand plains or sand dune crests in mallee heath, tall shrubland, open woodland or open heath communities on deep white, red or yellow-brown sand, but also between sand dunes in mallee heath

communities on clay soils. In the eastern part of its range, this subspecies is recorded growing on hill slopes and valley flats on soils derived from limestone, and on shallow to deep sandy alluvium on rocky river beds and banks.

Phenology: Flowers have been recorded in most months of the year, fruits from September to December with one collection in April.

Etymology: The subspecific epithet is from Latin *vestitus*, meaning 'clothed', in reference to the dense indumentum on the calyx lobes of female flowers of this subspecies.

Notes: This subspecies has long been known by the misapplied name *B. mitchellii* (Bentham 1873, Weber 1986, James and Harden 1990, Jeanes 1999). See 'Notes' under *B. oleifolia.*

Generally *Bertya tasmanica* subsp. *vestita* is remarkably morphologically uniform over the majority of its range from South Australia to western Victoria. The Rohrlach collection from the Eyre Peninsula, South Australia, *Rohrlach* 70 (AD), has a yellowish rather than greyish-white indumentum on its branchlets but it is otherwise typical of *B. tasmanica* subsp. *vestita.* Clintson's specimen from the Grampians, western Victoria, *Clintson* [CANB383031] (CANB), has a sparse stellate indumentum on the ovary and the calyx lobes in female flowers are acute to attenuate which is more characteristic of *B. tasmanica* subsp. *tasmanica.* However, the calyx lobes are sparsely stellate-pubescent, the leaves are robust and the habit is more characteristic of *B. tasmanica* subsp. *vestita.*

In the eastern portions of the range of *B. tasmanica* subsp. *vestita,* there are three variants that warrant further collection and study. These differ in habitat and vestiture characteristics found in plants of the more widespread typical variant to the west.

For comparison purposes, plants from most parts, i.e. the western portions, of the subspecies' distributional range may loosely be identified as belonging to the 'typical variant'. Those from the often disjunct eastern portions may loosely be treated as belonging to the 'golden-haired variant', the 'fine-haired variant' or the 'glabrous ovary variant'.

'Typical variant'

This variant occurs widely in South Australia and western Victoria.

Representative specimens: **South Australia.** Crown lands WNW of Kimba, Oct 1981, *Alcock* 8869 (AD, CANB); Hundred of Playford, section 282, N of Cowell, Aug 1965, *Alcock* 620 (AD, CANB); 50 miles [c. 80 km] from Kyancutta towards Kimba, on Eyre Highway, Aug 1968, *Canning* (AD, CANB, NSW); c. 29 km N of Pinnaroo on road to Loxton, Oct 1989, *Henderson & Turpin* H3319 (BRI); 3 miles [c. 5 km] N of MacDonald Reserve on Monarto road, Oct 1971, *Melville* 71.677 (AD, K); 2 miles [c. 3 km] W of Murray Bridge, Aug 1952, *Melville & Specht* 408 (MEL, NSW); Mt Rescue National Park, c. 16 km N of Keith, Aug 1968, *Orchard* 1010 (AD); Calperum sandridges, Oct 1980, *Spooner* 7231 (AD); Scorpion Springs Conservation Park, S of Pinnaroo, Oct 1923, *Symon* 8679 (AD, CANB); Mt Shaugh Conservation Park, Oct 1977, *Symon* 10726 (AD, CANB); Chauncey's Line, 10 km SE of Hartley, Sep 1958, *Whibley* 230 (AD). **Victoria.** c. 14 km N along the SA/Vic border track from its intersection with final 3 km track into Red Bluff, Big Desert, Nov 1984, *Albrecht* 1204 (MEL); Murrawong North, Sep 1986, *Beauglehole* ACB83935 (CANB, MEL); 3 miles [c. 5 km] S of Millewa Tank, Sunset Country, Sep 1965, *Filson* 7454A (MEL, NSW); c. 18 km W of Swan Hill, on road to Sealake, Sep 1989, *Henderson & Turpin* H3271 (BRI, CANB); c. 8 km S of Hattah heading towards Ouyen on Calder Highway, Sep 1989, *Henderson & Turpin* H3267 (BRI); S end of Hattah Kulkyne National Park, Bulldozed firebreak 200 m E of Calder Highway, 20 m S of roadside stop, Roadside stop is 27.3 km N of Ouyen, Aug 1996, *Macfarlane* 133 (MEL, NSW); c. 13 miles [21 km] N of Ouyen on the Calder Highway, Aug 1960, *Muir* 1190 (AD, BRI, DNA, MEL, NSW); c. 5.9 miles [9 km] N of Bore Mill, 30.4 miles [c. 49 km] N of Yanac, on Nhill-Murrayville Road, Big Desert, Aug 1959, *Smith* 59/160 (AD, BRI, CANB, MEL).

'Golden-haired variant'

This variant occurs in the Yarrangobilly area on the Southern Tablelands of New South Wales where it is recorded as growing on steep hill slopes and valley flats on soils derived from limestone. The indumentum on most parts is golden-brown and coarser than that in plants typical of *B. tasmanica* subsp. *vestita*. Also, the capsules are less densely hairy than is typical.

Representative specimens: **New South Wales.** on track to Castle Cove at Yarrangobilly Caves, Oct 1993, *Duncan* (BRI [AQ580505], NSW); Clarke Gorge, Cave Creek, Coolamon Caves, 44 km NNE of Kiandra, Jan 1997, *Jobson et al.* 4616 (BRI, NSW); Cave Creek near the Blue Waterholes (head of Goodradigbee River), Nov 1970, *Rodd* 1532, 1532A (NSW); Cave Creek, ¼ mile [c. 400m] N of the Blue Waterholes (11 miles [c. 18 km] NE of Rules Point), Apr 1969, *Rodd* 806 (NSW); near parking lot opposite Caves House, Yarrangobilly Caves, Nov 1982, *Spate* [CANB463637]

(CANB); Kosciusko National Park, Yarrangobilly Caves, near Glory Arch, Feb 1981, *Taylor & Hadlow* 1328 (CANB); Cooleman Caves area, on Caves Creek, Jun 1965, *Whaite & Whaite* 2864 (NSW); Yarrangobilly Caves, Dec 1948, *Whaite* [NSW194931] (NSW).

'Fine-haired variant'

This variant is recorded mostly from along rivers in eastern Victoria, the Southern Tablelands of New South Wales and the Australian Capital Territory growing on sandy alluvium on rocky river beds and banks, with two records (*Costin*, MEL & NSW) from a treeless basaltic slope. The indumentum on most parts is greyish-white but generally consisting of more slender hairs than those found in the 'typical variant'. The 'fine-haired variant' has generally sparsely hairy and more attenuate calyx lobes in female flowers, and sparsely hairy capsules.

Representative specimens: **Australian Capital Territory.** Pine Island on the Murrumbidgee River, Oct 1971, *Berg* RYB371A (CANB); Angle crossing on Murrumbidgee River, Aug 1988, *Lepschi* 31 (CANB); near Uriarra Crossing, Apr 1954, *McKee* 970 (NSW); Pine Island, Oct 1955, *Moore* 3076 (CANB); Murrumbidgee River, below Kambah Pool, 1 km SSW of Forster Hill, Sep 1989, *Telford* 10822 (BRI, CANB). **New South Wales.** Murrumbidgee and Cotter River junction, Nov 1911, *Cambage* 2980, 2989 (NSW); Cooma, Monaro District, Aug 1948, *Costin* [MEL114081] (MEL); SE of Slack Creek crossing, Cooma - Dry Plain road, Aug 1948, *Costin* [NSW194910] (NSW); 'Murrunga', 8 km S of ACT border, Murrumbidgee River at confluence with Gossoon Creek, Oct 1995, *Crawford* 3165 (CANB, NSW). **Victoria.** Mitta Mitta River, Jan 1854, *Mueller* [MEL114072] (MEL).

'Glabrous ovary variant'

This variant is recorded from scattered localities in the Eastern Highlands of Victoria and the Southern Tablelands of New South Wales. It grows in a habitat similar to that of the 'fine-haired variant'. The 'glabrous ovary variant' has a pale yellow indumentum especially on young shoots, glabrous ovary, sparsely hairy to glabrous calyx lobes and leaves somewhat shorter than those of the 'typical variant'.

***Representative specimens*: New South Wales.** Braidwood District, Jan 1885, *Bauerlen* 369 (MEL); Umaralla River c 3 km SE of Dangelong, c. 20 km SSE of Cooma, Feb 1984, *James & Taylor* 527 (NSW); c. 23 km SSE of Nimmitabel, banks of Bombala River at crossing of New Line Road, Jun 1993, *Makinson & McGillivray* 1211 (BRI, CANB); Umaralla River, downstream from Dangelong, Jun 1976, *Parris* [NSW194934] (NSW); McLaughlin River, 200 m upstream from junction with Jettiba Creek, 7 km directly S of Nimmitabel, Oct 1999, *Taws* 1091 (BRI). **Victoria.** Narracan, Sep 1982, *Merson* [MEL625980] (MEL); Bundarrah River bridge at Angler's Rest (Blue Duck), c. 18 miles [29 km] NW of Omeo, Nov 1962, *Rogers* [MEL114282] (MEL).

28. **Bertya virgata** (Ewart) Halford & R.J.F.Hend. **comb. nov.**

Beyeria virgata Ewart, Proc. Roy. Soc. Victoria 33(new series): 226/7 (1921). **Type:** [Western Australia.] Lake Lefroy, 7 November 1891, *R. Helms* (holo: MEL [MEL114229]; iso: NSW [NSW194995, NSW194996, NSW273281], K).

Bertya dimerostigma var. *cupressoidea* Grüning in A. Engler, Pflanzenr. H.58: 62 (1913); *Bertya cupressoidea* (Grüning) Airy Shaw, Kew Bull. 26(1): 67/8 (1971). **Type:** [Western Australia.] Lake Lefroy, 7 November 1891, *R. Helms* (holo: NSW [NSW194995]; iso: NSW [NSW194996, NSW273281], MEL [MEL114229], K).

Dioecious, much branched shrubs to 1.4 m high, viscid especially on young shoots. Branchlets ± angular, glabrous, with surface papillose under viscid layer. Leaves sessile or shortly petiolate, spirally alternate, appressed; petiole, where present, plano-convex, up to 0.4 mm long, glabrous, smooth; lamina oblong, 1.5–3 mm long, 0.8–1.3 mm wide; adaxial surface green, glabrous, ± smooth; abaxial surface white, densely hairy with sessile stellate (up to 0.1 mm across) and simple (up to 0.5 mm long) hairs; margin strongly recurved to midrib concealing abaxial surface; apex rounded, usually ultimately shortly apiculate and terminated by a gland; base obtuse; midvein obscure adaxially, abaxially raised and rounded, glabrous, smooth; marginal glands sometimes present at base of lamina when 1 each side of midrib, c. 0.1 mm across, sessile. Inflorescences of a single flower, pedunculate, axillary; peduncles up to 0.5 mm long; bracts 4–8, persistent, oblong to linear, 1–2 mm long, 0.3–0.8 mm wide, obtuse or rounded at tip, glabrous. Male flowers sessile; calyx lobes 5, of unknown colour when fresh, elliptic, 2.7–

4.0 mm long, 1–3.7 mm wide, rounded at tip, glabrous; androecium c. 2 mm long, c. 0.5 mm across; stamens c. 26; filaments 0.1–0.2 mm long; anthers 0.8–0.9 mm long. Female flowers sessile; calyx 5-lobed, of unknown colour when fresh; tube up to 0.1 mm long; lobes unequal with inner lobes narrower, erect, ovate or elliptic-ovate, 2.1–2.3 mm long, 0.9–1.5 mm wide, rounded to obtuse at tip, glabrous, with margins entire or minutely fimbriate; petals absent; ovary ovoid, c. 1.5 mm long, 0.6–1.3 mm across, 3-locular, glabrous; style with glabrous column 0.2–0.3 mm long and 3 spreading limbs; limbs of unknown colour when fresh, c. 1 mm long, c. 0.3 mm wide, deeply 2-lobed; lobes 0.6–1 mm long, 0.1–0.2 mm wide. Capsule ellipsoid, 3.9–4.5 mm long, 3.2–3.7 mm across, glabrous, 1 - seeded; persistent calyx lobes ≤ half the capsule length. Seed ellipsoid, c. 3.3 mm long, c. 2.5 mm wide, c. 2.4 mm across, light brown; caruncle not seen.

***Selected specimens (from 11 examined)*: Western Australia.** 84 km from Norseman along Eyre Highway to Balladonia, Feb 1970, *Barnsley* 1069 (CANB); 76 km E of Norseman on Eyre Highway, Aug 1995, *Cranfield* 10044a (NSW); c. 75 km ENE of Norseman, Sep 1973, *Donner* 4652 (PERTH); Lake Lefroy, Nov 1891, *Helms* (MEL, NSW); 46 miles [c. 74 km] E of Norseman, Oct 1963, *Jefferies* 631016 (K, PERTH); [without locality,] May 1964, *Jefferies* 640505 (PERTH); 22 km E of Sinclair Soak, c. 70 km NE of Norseman, Sep 1980, *Newbey* 7510 (CANB, PERTH); 30 km E of Sinclair Soak, c. 90 km NE of Norseman, Aug 1980, *Newbey* 7079 (PERTH).

***Distribution and habitat*:** *Bertya virgata* is confined to the south-west of Western Australia between Coolgardie and Norseman (Map 33). It is recorded as growing in open mallee or low open woodland communities on well-drained aeolian sandy or pebbly brown sandy clay soils on sand dunes.

***Phenology*:** Flowers have been recorded in May, August and September, fruits in August and September.

Excluded names

Bertya andrewsii W.Fitzg., J. Western Australia Nat. Hist. Soc. 2(2): 31 (1905) = ***Ricinocarpos stylosus*** Diels

Bertya gummifera var. *psiloclada* Müll.Arg., Flora 47(30): 471 (1864) = ***Ricinocarpos psiloclada*** (Müll.Arg.) Benth.

Bertya psiloclada (Müll.Arg.) Baill., Adansonia 6: 299 (1866), *nom. inval.* = ***Ricinocarpos psiloclada*** (Müll.Arg.) Benth.

Bertya quadrisepala F.Muell., Fragm. 10: 52 (1876) = ***Ricinocarpos muricatus*** Müll.Arg.

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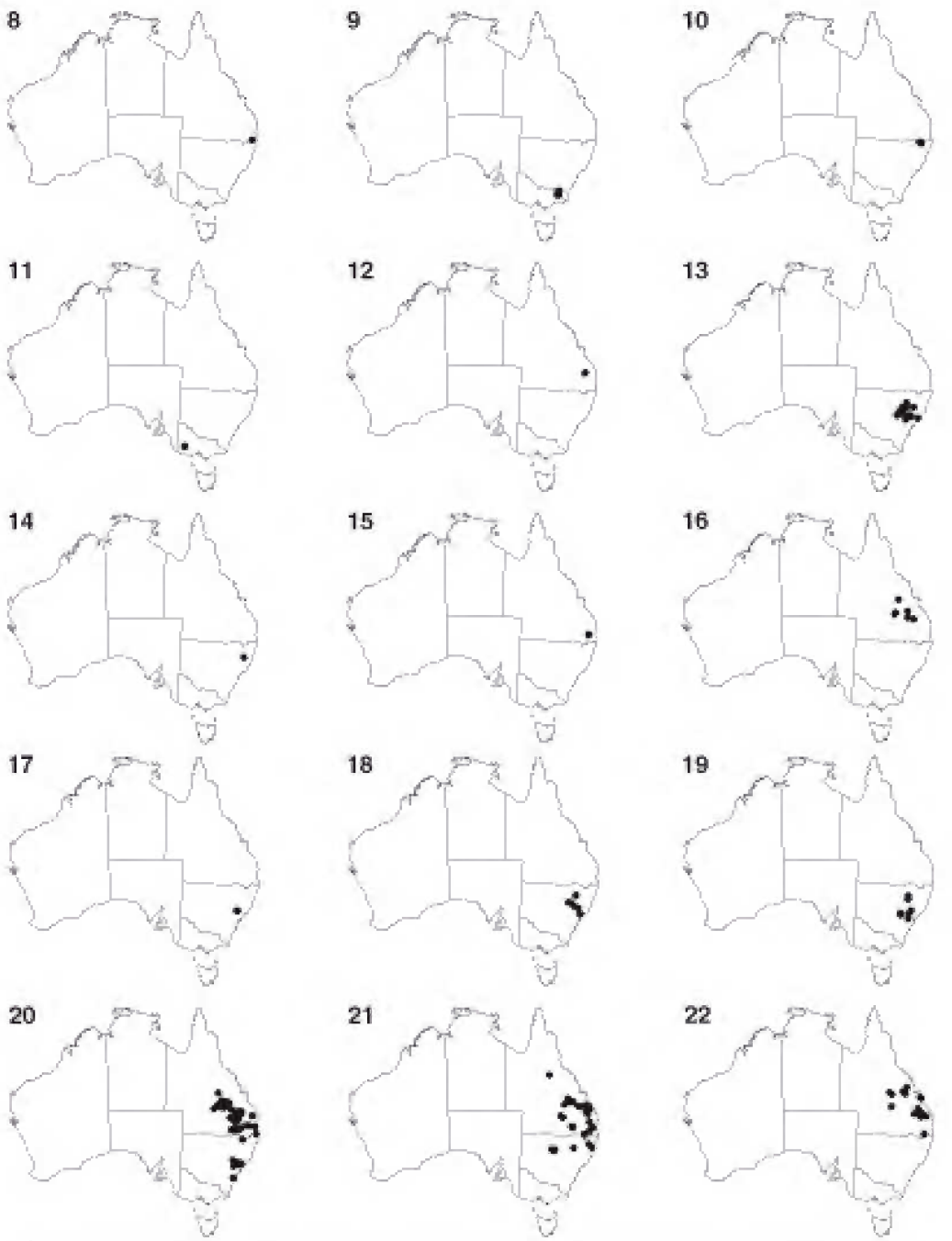
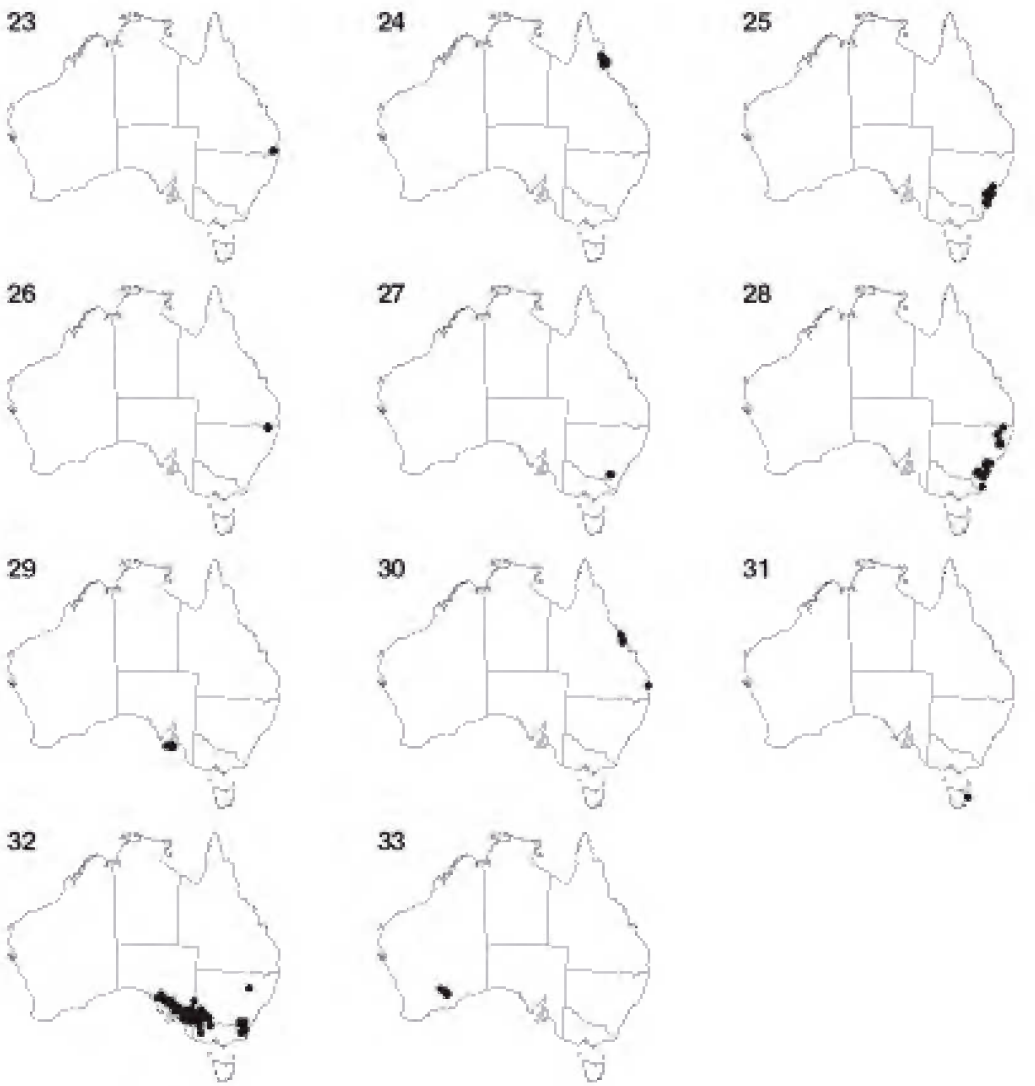
Maps 2–7. Distribution of *Bertya* taxa. **2.** *Bertya brownii* **3.** *Bertya calycina* **4.** *Bertya cunninghamii* subsp. *cunninghamii* **5.** *Bertya cunninghamii* subsp. *pubiramula* **6.** *Bertya cunninghamii* subsp. *rupicola* **7.** *Bertya dimerostigma*



Maps 8–22. Distribution of *Bertya* taxa. **8.** *Bertya ernestiana* **9.** *Bertya findlayi* **10.** *Bertya glandulosa* **11.** *Bertya grampiana* **12.** *Bertya granitica* **13.** *Bertya gummifera* **14.** *Bertya ingramii* **15.** *Bertya lapicola* subsp. *lapicola* **16.** *Bertya lapicola* subsp. *brevifolia* **17.** *Bertya linearifolia* **18.** *Bertya mollissima* **19.** *Bertya oblonga* **20.** *Bertya oleifolia* **21.** *Bertya opponens* **22.** *Bertya pedicellata*



Maps 23–33. Distribution of *Bertya* taxa. **23.** *Bertya pinifolia* **24.** *Bertya polystigma* **25.** *Bertya pomaderroides* **26.** *Bertya recurvata* **27.** *Bertya riparia* **28.** *Bertya rosmarinifolia* **29.** *Bertya rotundifolia* **30.** *Bertya sharpeana* **31.** *Bertya tasmanica* subsp. *tasmanica.***32.** *Bertya tasmanica* subsp. *vestita* **33.** *Bertya virgata*

Index to Scientific Names

Names in bold type are accepted names and those in light are synonyms etc. The numbers refer to the number of the species accepted in the above taxonomic treatment. 'Excl.' refers to a name listed under Excluded names which applies to a taxon generically distinct from *Bertya*.